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THE LARGEST MECHANICAL CIRCULATION IN THE WORLD

MACHINERY

PUBLICATION OFFICES 49-55 LAFAYETTE STREET CORNER LEONARD NEW YORK SUBWAY STATION WORTH STREET

Regular Edition
Vol. 14 No. 12

August 1908

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Gears for all Sizes of Machinery in between.

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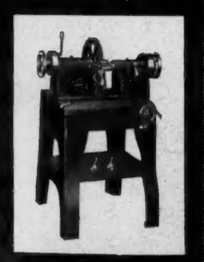

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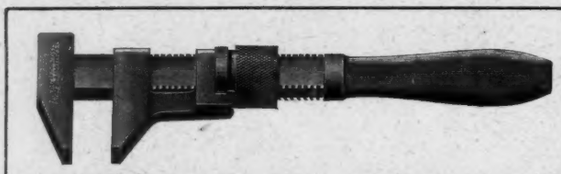

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With head, bar and shank a one piece steel forging it is practically indestructible; the steel handle permits its use in mud, water, steam or heat; it has enormous gripping power, great strength and durability and the handle is especially designed to fit the hand without tiring it. **Simple, easily adjusted and built for business.**

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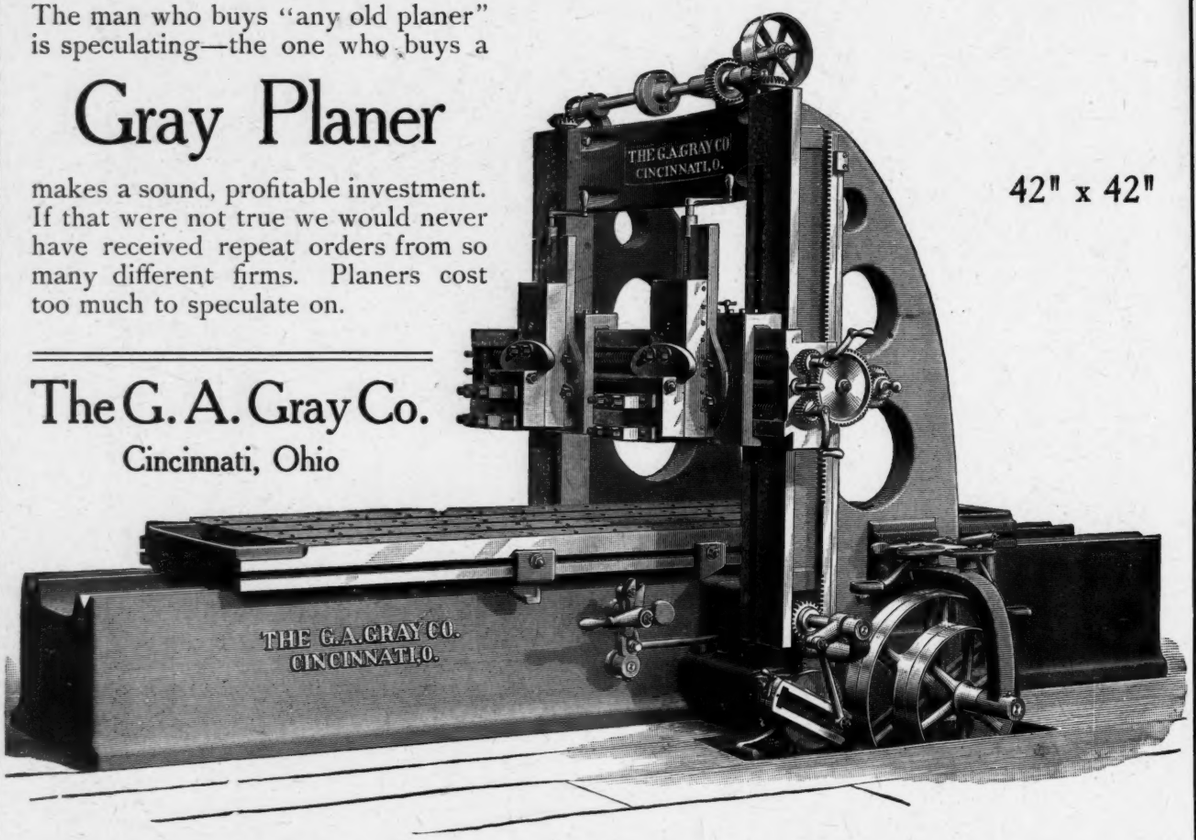

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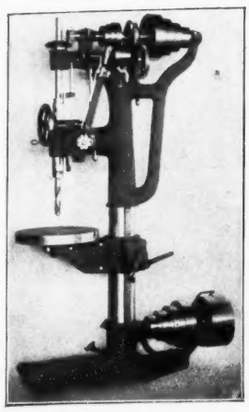

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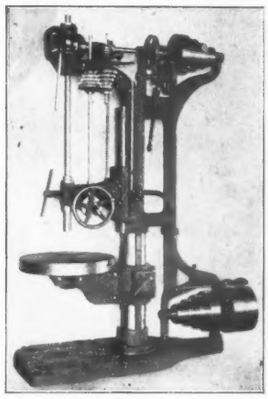

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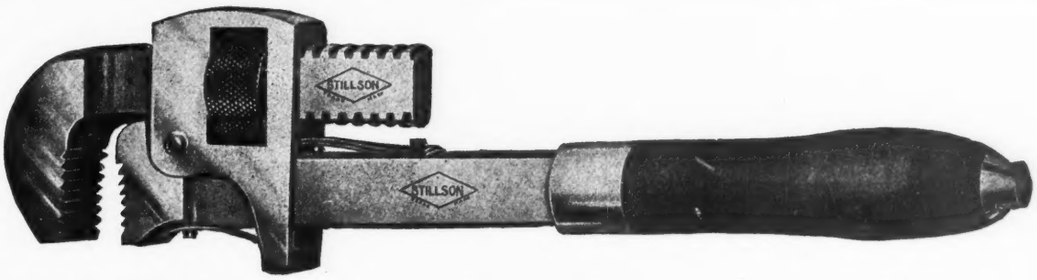

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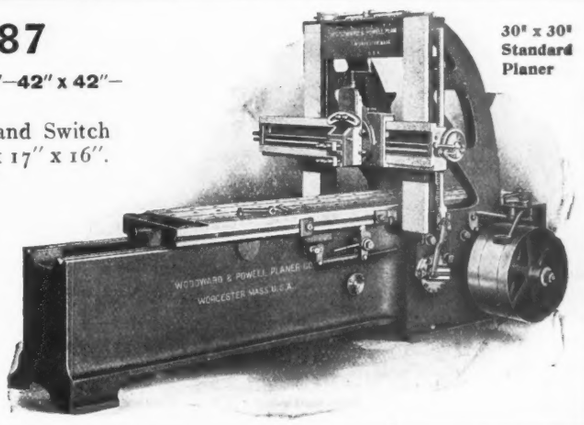

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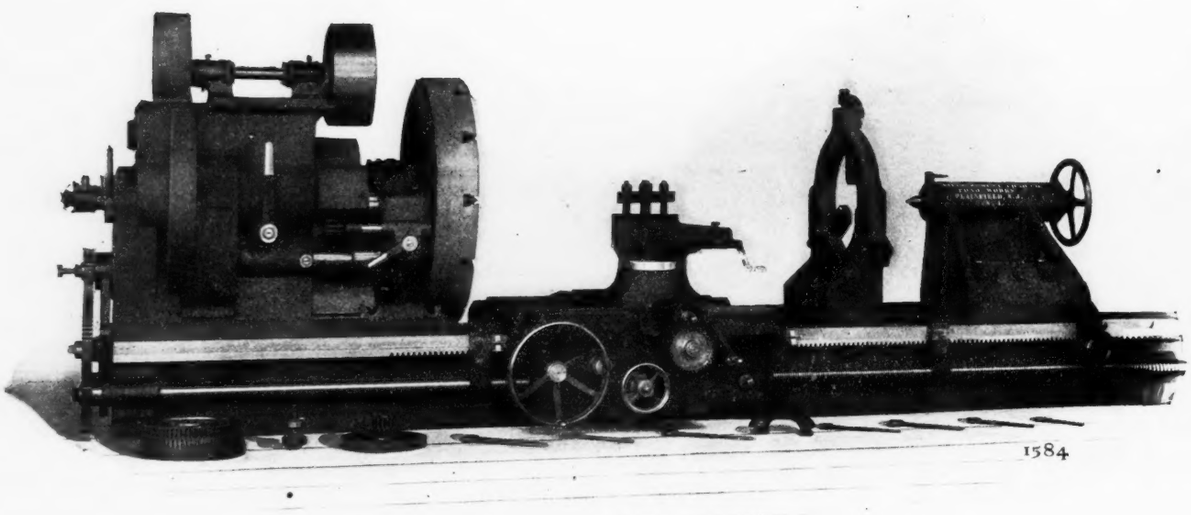
GEARED HEAD

Driven by single pulley with wide belt or direct connected motor.



48-inch Pond Geared Head Engine Lathe.

A heavy powerful machine for use with high-power steel tools.

The face plate spindle is driven by a single pulley of large diameter and a wide belt through gearing, which, in connection with the two-speed counter, gives twelve spindle speeds.

Machine swings 49 inches over the bed and 39 inches over the carriage—with 16 foot bed will turn 7 feet between centers.

All shafts in headstock run in bronze bearings, which are self-oiling with large oil wells.

When motor driven a variable speed motor is mounted on headstock and is direct connected through gearing, giving a wide range of speeds.

Drive may be readily changed from belt to motor after machine is installed.

Photographs and full description furnished on request.

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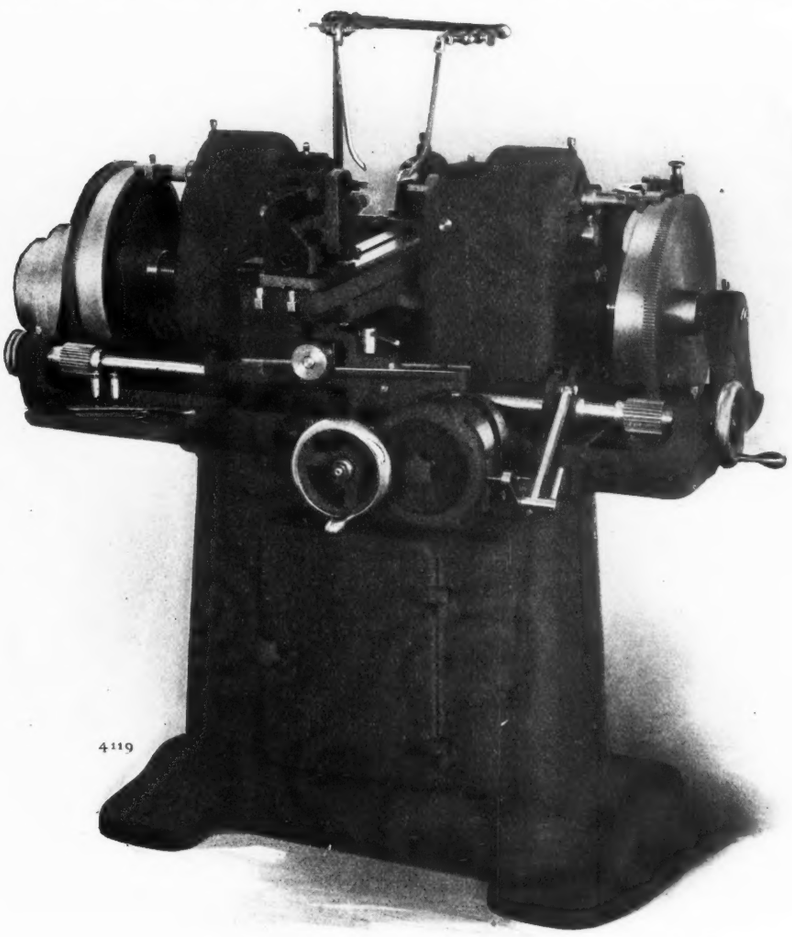

The New Spline Milling Machine.

This machine, embodying new principles, takes care of work for which heretofore there has been no suitable machinery.

Considering its use the designer may take advantage of the use of slots—which many times would simplify his designs, but which have in the past been avoided owing to the high manufacturing cost.

The great advantage of this tool will appeal to the manufacturer who has formerly been compelled to resort to expensive broaching operations or to hand milling for cutting keyways with closed ends, and tang slots which owing to their depth require extreme care in manipulation of tools as well as the continuous services of a skilled operator.

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We have recently conducted a series of experiments showing the productiveness of our up-to-date Patent Head engine lathe.

The above illustration shows **450 blank gears made from steel forgings.** They range from 3¼″ to 8¼″ in diameter and 1″ face. They are guaranteed within .002 of absolute truth in diameter or parallel. Compare this with the product from some of the automatic or expensive machines now being used, and consider that no trimming or additional work is needed, every piece delivered being fully guaranteed as to quality.

The above 450 pieces were produced on our 20″ Patent Head lathe in forty-five hours.

There is no elaborate complicated machine extant so far as we know, able to duplicate this production. To accomplish this it is necessary to supply a power feed turret on bed, suitable chucking devices and certain boring, turning and facing tools. All of these, however, with the additional equipment, make a less costly outfit than some of the machines mentioned. The outfit is adaptable to almost any kind of work within its range at small cost of tools, while the lathe proper may be used for any kind of work that a lathe is called upon to do.

It is our intention to show other lines of work from time to time, as the various tests are completed.

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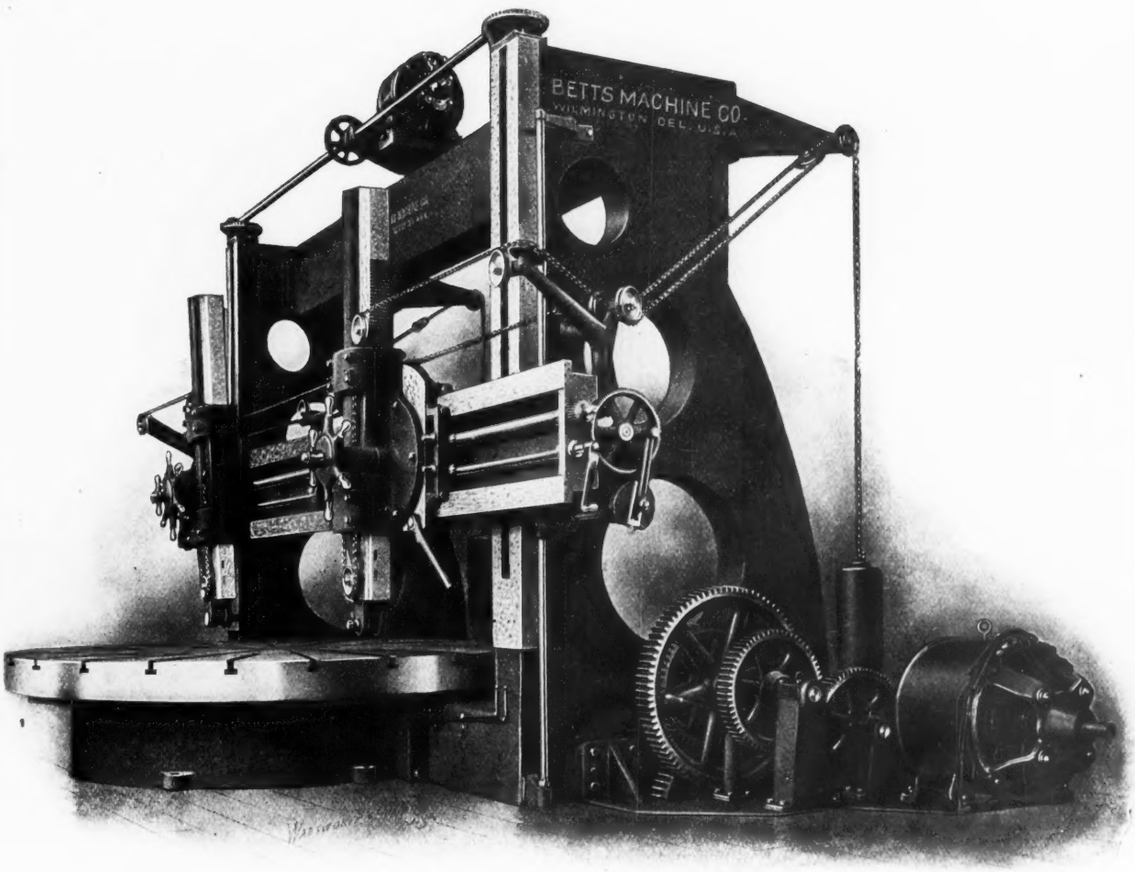
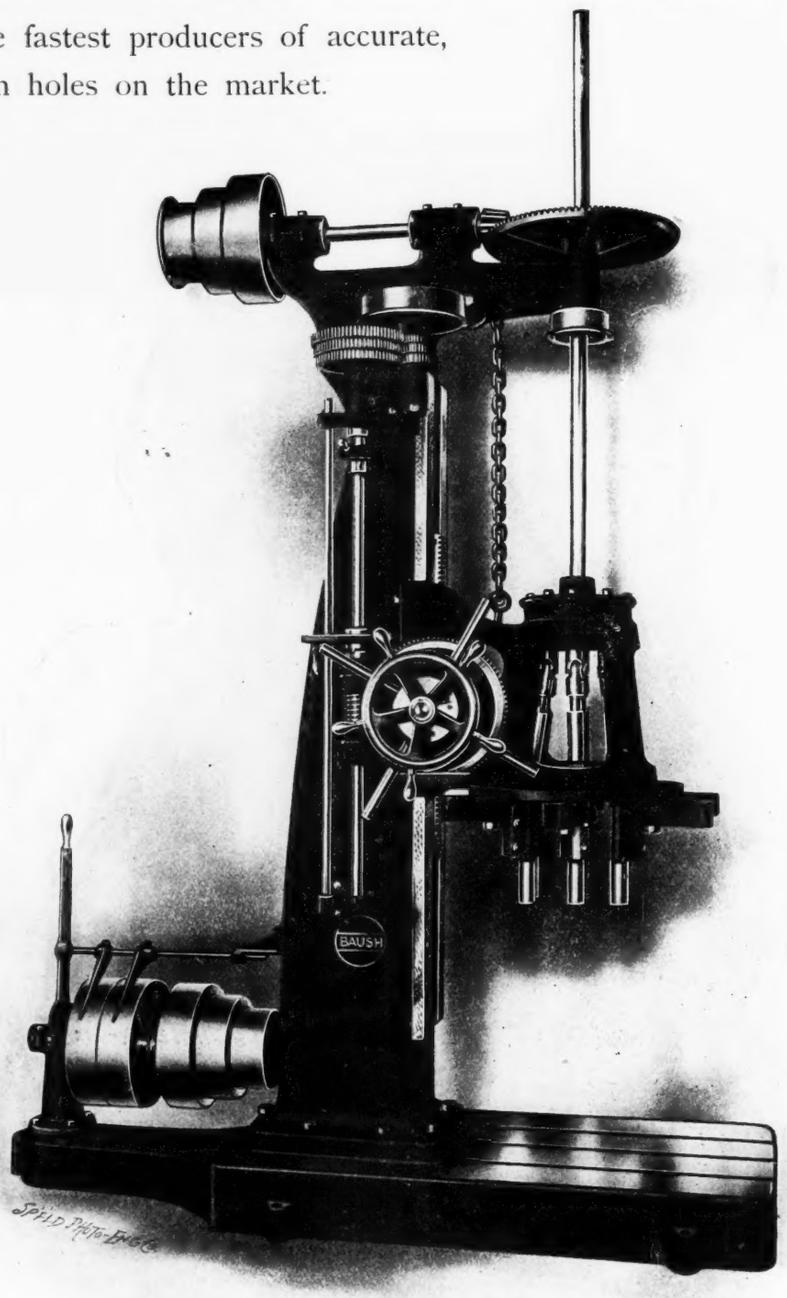


The BETTS 16-ft. Boring and Turning Mill, arranged with Motor Drive and 14-ft. diameter Table for Fore River Shipbuilding Co., Quincy, Mass.

Boring and Turning Mills, Horizontal Boring Machines, Planers, Slotters, Tire Mills, Floor Borers, Chord Borers, etc., etc.

The Baush Adjustable Multiple Drills

are the fastest producers of accurate, uniform holes on the market.



They are made in 20 different sizes and several styles; carrying spindles which are adjustable to cover any layout and all holes are drilled simultaneously. Let us show you the drill for your work.

Cut shows our No. 16 Multiple, for six 1″ drills. Ask for bulletins.

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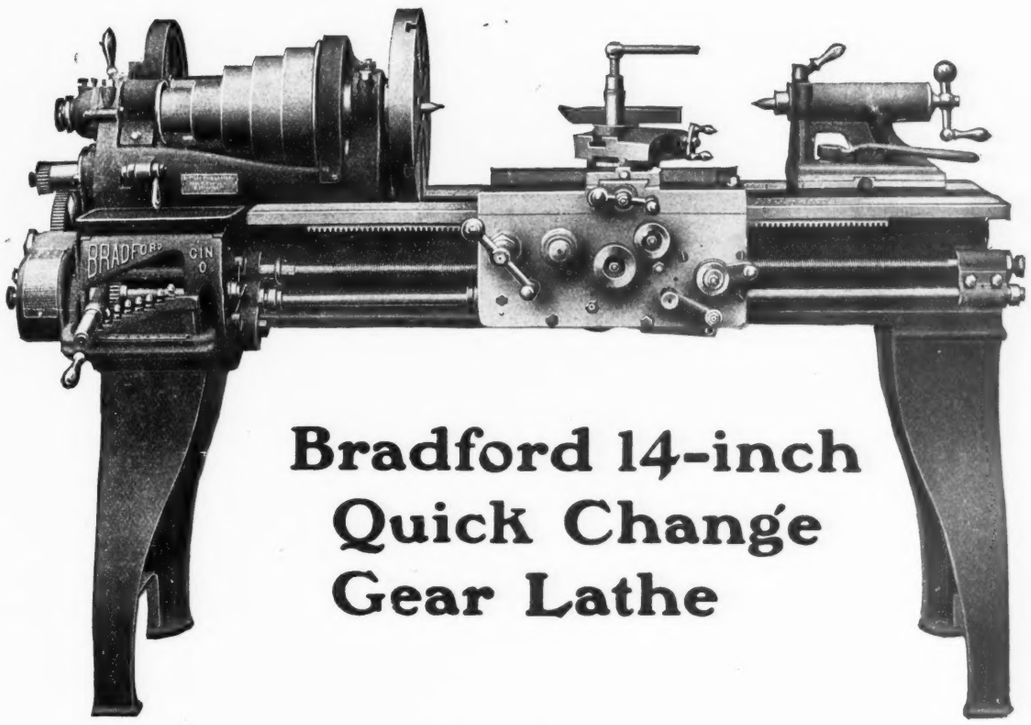

Bradford 14-inch Quick Change Gear Lathe

An Unlimited Range of Threads and Feeds

is one of the many advantages of this machine, a feature that alone would put it in the front rank among screw cutting lathes. There are feeds for chasing all standard threads, right or left hand, and extra gears can be supplied for any special thread desired. One lever serves for all threads; screw is not in motion except for screw cutting, and feeds without removal of a gear.

The 14-inch Lathe is essentially a tool for speed, capacity and precision. It is back geared 9.6 to 1, has power, cross and length feed to the tool rest, and non-interfering reverse in the apron. It is simple and rapid in operation. Convenient in every way. All parts easily accessible.

Bradford Lathes include Sizes from 14" to 42" Swing.

Catalogue mailed on request.

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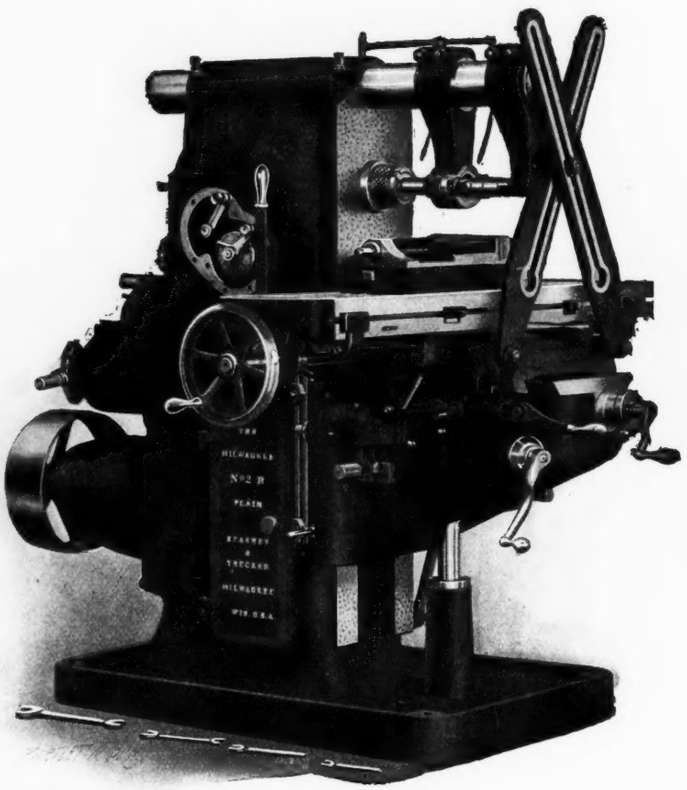
ONE OILING FOR THE SEASON'S WORK



Is the treatment required by **Milwaukee Millers** and no stuck or cut bearings interfere with the steady employment of the machines at their maximum capacity. All gears and bearings are automatically flooded with oil, preventing noise and reducing friction and wear to a minimum.

Every machine is equipped with a pump for supplying a flood of lubricant to the cutters and ample means are provided for its return to the reservoir in the base of the machine. Wide tables on both Plain and Universal Machines, a great advantage in clamping work. Single pulley drive without countershaft or overhead belts and electric motor can be attached at any time.

Full particulars on request.

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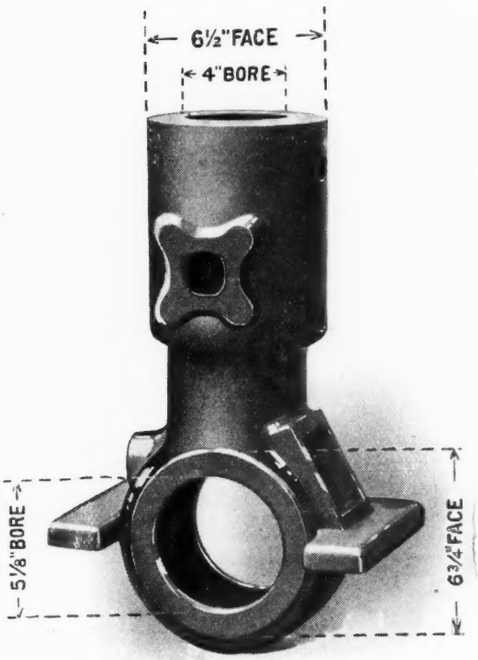

On our No. 3 Machine,

with a set of tools made by us, this Gasoline Motor Frame can be finished to these dimensions at the rate of ONE EVERY SIXTY MINUTES, making a most accurate and smooth job.

A CUSTOMER WRITES:

"Yours of the 17th inst. to hand. In reply will say that we have a Binsse Horizontal Boring Machine in our shop and it is proving very satisfactory. We are doing the class of work shown by leaflet "A" and are making even better time than one in sixty minutes. I have had a Binsse Horizontal Boring Machine in my shop for the past three years, and can say that I would not attempt to compete in the gas engine market without one of these machines."

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MECHANICAL ENGINEERS.
Technical Department II. Headquarters for American Machinery. Metal and Wood Working Machinery. Established 1847. Telegraphic Address, "Metallicus," Rotterdam.

WYNMALEN & HAUSMANN. Rotterdam.
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Glashaven. 4-14. Established 1875. Special Tools, Metal and Wood Working Machinery.

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GRIMALDI & C., Casella 320, Genova.
AMERICAN MACHINERY AGENTS.
Branch house in Milan, Italy.

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MACHINERY AND TOOLS.

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Invites correspondence with first-class American firms with a view to representing them in Norway.

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MACHINERY AND TOOLS.

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SPECIALTY: MACHINE TOOLS.
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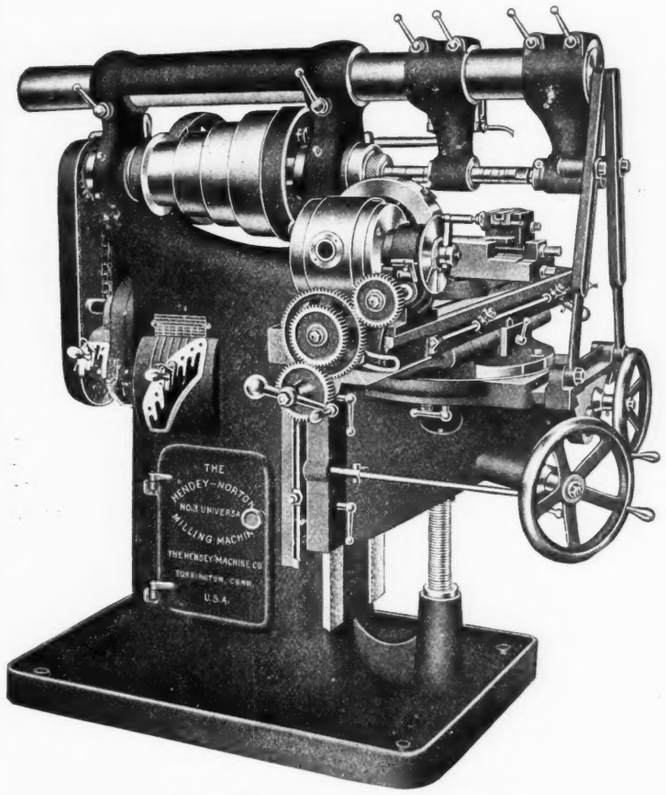
IMPORTERS OF AMERICAN MACHINERY.
Technical Appliances.

SPOERRI & CO., Bergstrasse 76, Zurich.
ENGINEERS AND IMPORTERS OF MACHINERY.

THE AMERICAN MACHINERY IMPORT OFFICE, 24, Weinbergstrasse, Zurich.



No. 3 Universal Milling Machine.

No. 3 Universal Milling Machine

Working Surface of Table, 48¾" x 11"
Feeds (all automatic), 30" x 10" x 19"

EQUIPMENT: Two-speed countershaft, necessary wrenches, cutter-arbor and draw-in bolt, center and bushing supports for arbor, dividing head and foot stock center with raising block, center rest, universal chuck, necessary change gears, index plates, swivel vise, guard for nose of spindle, instruction cards.

No. 3 Plain Milling Machine

Working Surface of Table, 48½" x 13"
Feeds (all automatic), 34" x 10" x 20"

EQUIPMENT: Two-speed countershaft, necessary wrenches, draw-in bolt, center and bushing supports for arbor, flanged vise, guard for nose of spindle, instruction card.

All feeds positive driven through gearing, giving 21 changes.

Automatic feeds can be operated simultaneously and reversed while machine is in motion.

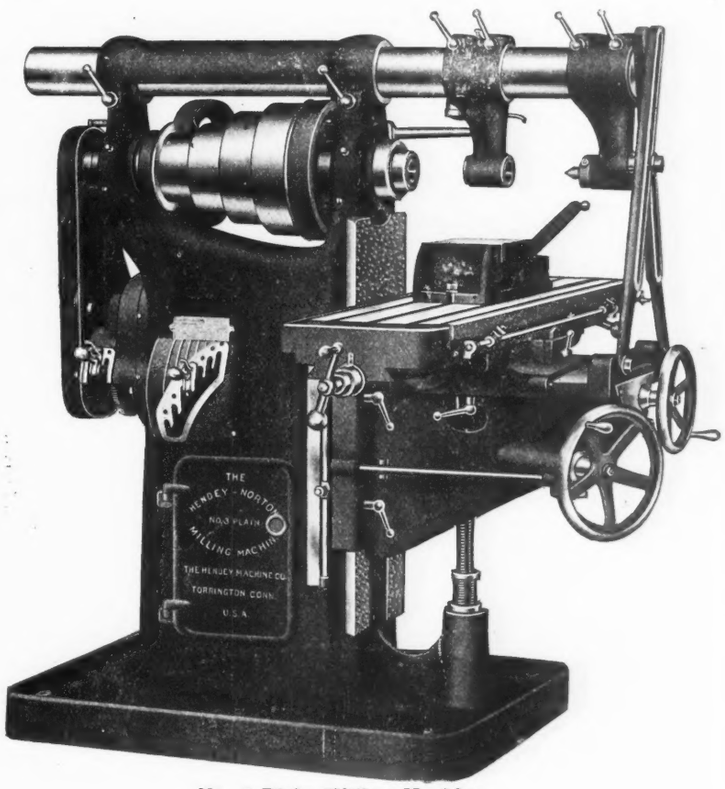
Adjustable dials reading to thousandths on all feeds and trips have micrometer adjustment.

The bearings in head are annular in construction with taper bearings for spindle, which are self-oiling, self-adjusting.

Upper housings for overhanging arm are annular in form, the arm being ground to fit sleeves, and is clamped by self-centering bushings which do not disturb alignment of arm after setting.

Elevating screws are telescopic and with table feed screw are fitted with ball thrusts.

Knees are reinforced and have projected bearing on column.



No. 3 Plain Milling Machine.

THE HENDEY MACHINE CO., Torrington, Conn., U. S. A.

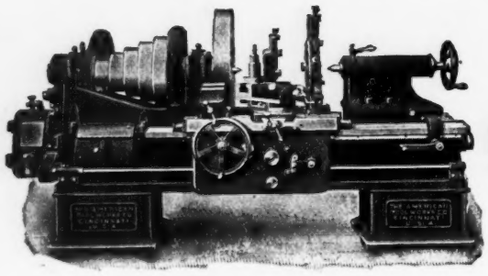
UNITED STATES AGENTS—Manning, Maxwell & Moore, Inc., New York, Boston, Philadelphia, Pittsburg, Chicago, Syracuse, Cleveland, Detroit, Atlanta, Ga., Birmingham, Ala., Seattle, Wash., Mexico and Japan. W. M. Pattison Machinery Co., Cleveland. Robert Gardner & Son, Montreal, Canada. A. R. Williams Machinery Co., Toronto, Canada.

EUROPEAN AGENTS—C. W. Burton, Griffiths & Co., London, for Great Britain. Heinrich Dreyer, Berlin, for Germany. Henry Hamelle, Paris, for France. Stussi & Zweifel, Milan, for Italy.

"AMERICAN"

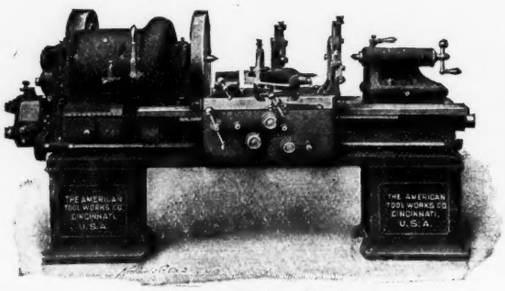
TOOLS ARE NOTED FOR THEIR GREAT

PRODUCTIVE CAPACITY



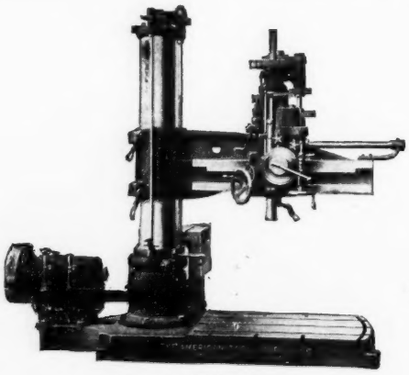
14-in. to 62-in. Swing.
"AMERICAN" Quick-Change-Gear Lathe.
(Cone Pulley Drive.)

POWER



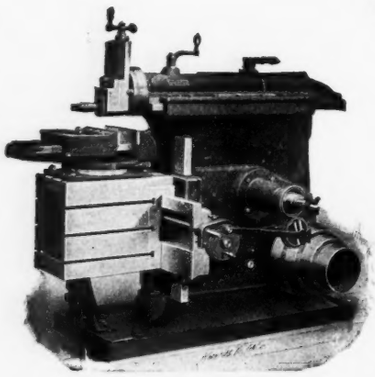
14-in. to 62-in. Swing.
"AMERICAN" "Patented" Geared-Head Lathe.
(Single Pulley Drive.)

DURABILITY



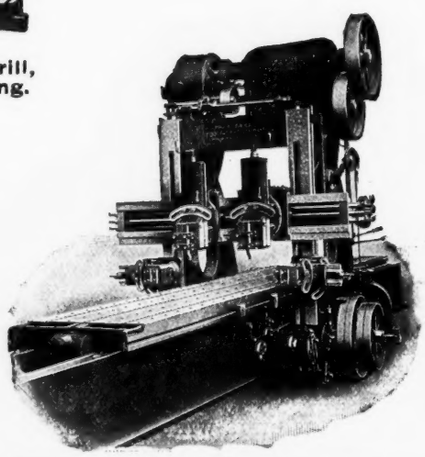
2-ft. to 7-ft. Arm.
"AMERICAN" Plain Radial Drill,
Holds Record for Rapid Drilling.

SIMPLICITY



15-in. to 28-in. Stroke.
"AMERICAN" Back Geared Shaper.
A Marvel for Heavy Duty.
A Manufacturing Tool.

ACCURACY



22-in. to 72-in. Between Housings.
"AMERICAN" Planer, Built with 1, 2 or 4
Cutting Speeds in both Standard
and Widened Patterns.

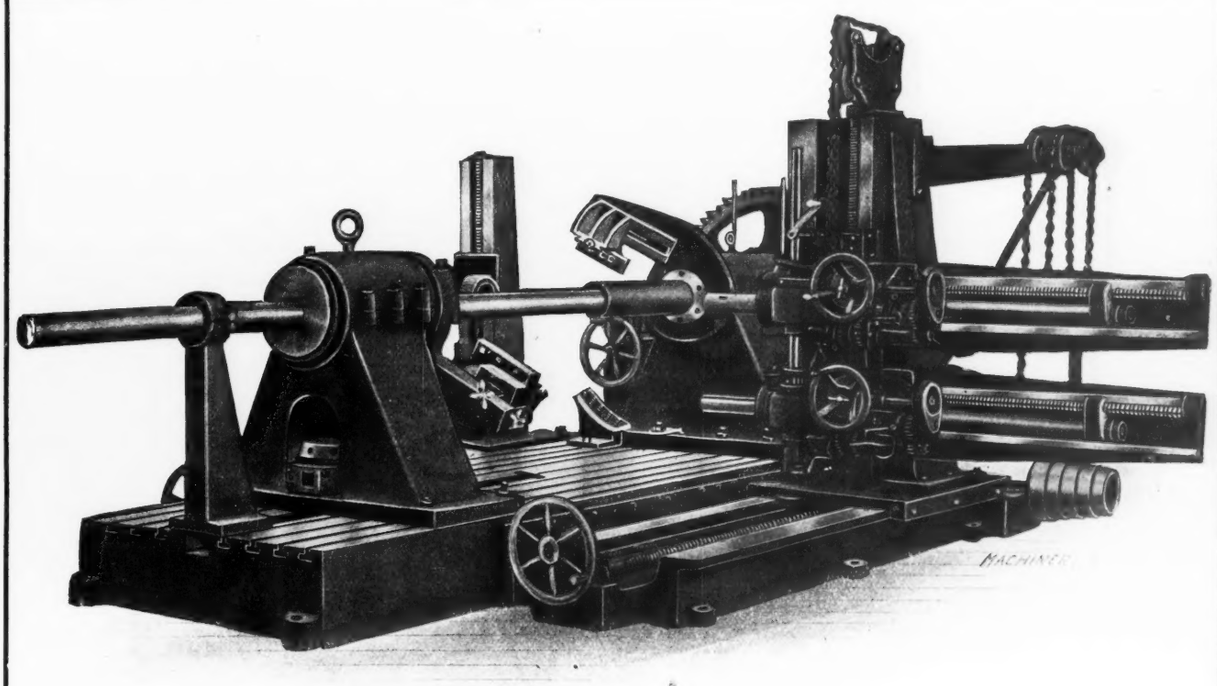
CATALOG "K" NOW READY

"AMERICAN" TOOLS hold the record for **PRODUCTION.** Increase your **OUTPUT** without increasing your operating expenses. **WILL STAND UP** under continuous **HARD SERVICE** of **MODERN METHODS.** They are built for **FAST SPEEDS** and **HEAVY FEEDS.**

BELT OR ELECTRIC-MOTOR DRIVE

THE AMERICAN TOOL WORKS COMPANY

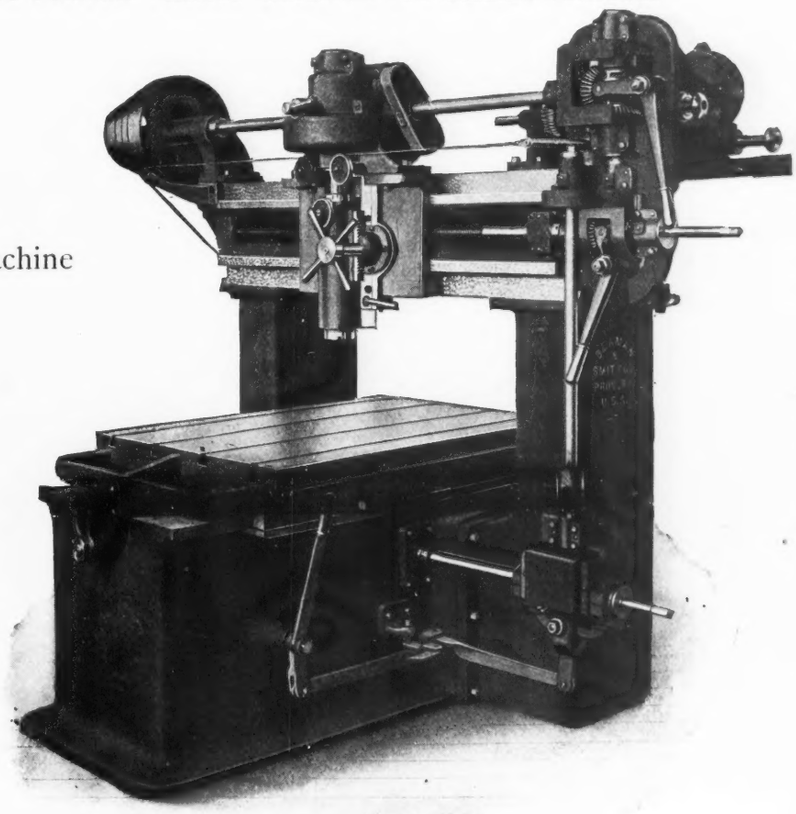
300 to 350 Culvert St., CINCINNATI, O., U. S. A.



Corliss Cylinder Boring Machine

WE ARE PREPARED TO FURNISH VARIOUS MACHINES FOR SIMILAR PURPOSES

Quick Operating Vertical Spindle Milling Machine



Conveniently controlled. Power quick movements and feeds in either direction of work table and spindle saddle. Table 36″ wide, 48″ long.

Send for latest Catalogue.

THE BEAMAN & SMITH COMPANY

Providence, Rhode Island, U. S. A.

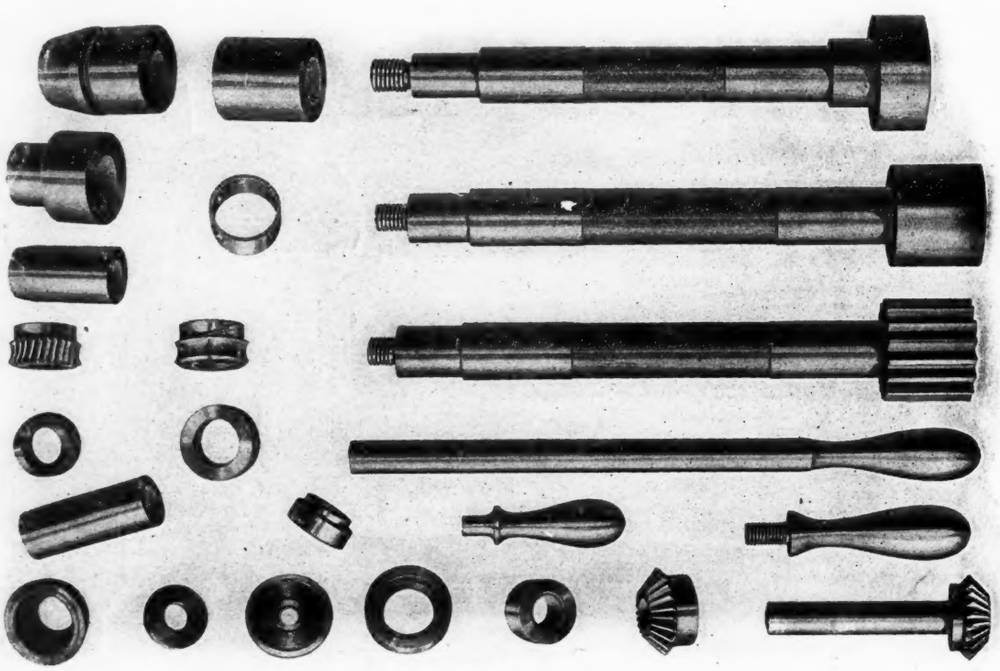
AGENTS—Chas. Churchill & Co., London. Ludw. Loewe & Co., Berlin. Fenwick Freres & Co , Paris

Samples of chuck work.

There's an all around Shop using

The operator is *Satisfied* he can do a good day's work, the superintendent is *Satisfied* with the quality of work produced and the manufacturer is *Satisfied* that he will reap a *Satisfactory* profit.

Reasons for it, of course—the very best of reasons. You'll find them in the sterling qualities of the machine itself. Its strength, convenience, the rigid control of work and tools; wide range of usefulness; ability to handle chuck or bar work with equal facility; rapid change from one class of product to another; universal equipment of tools, and in the special Flat Turret features such as Cross-sliding Head, Single Drive, Variable Speed device and unusual system of lubrication.

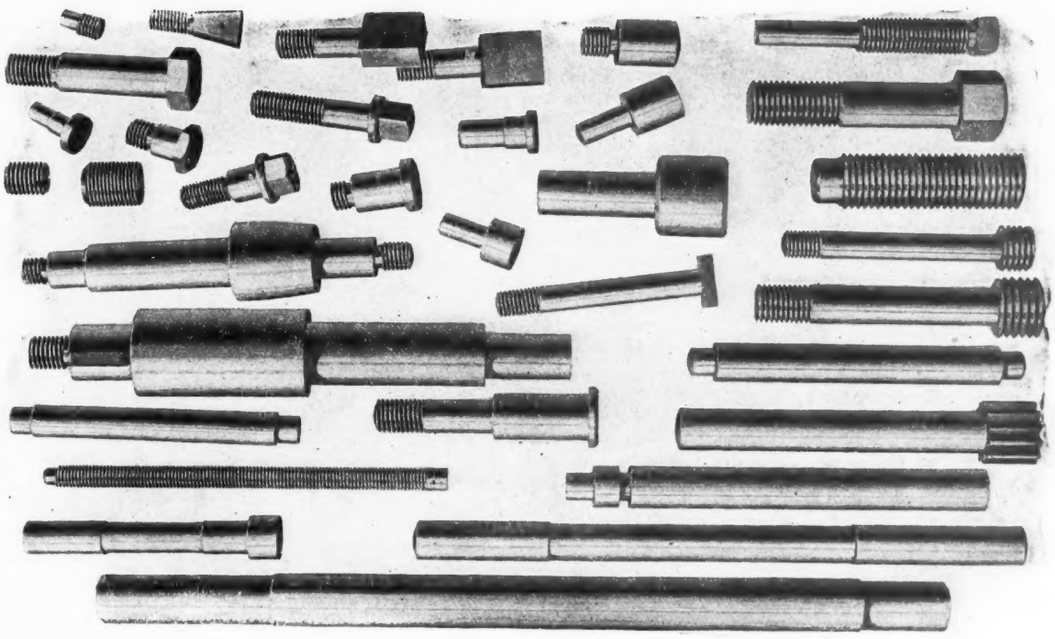


Work from the bar turned out on the Flat Turret Lathe.

Springfield, Vermont, U. S. A. **JONES & LAMSON MACHINE**

Germany, Holland, Belgium Switzerland, Austria-Hungary, M. Koyemann, Charlottenstrasse, 112 Dusseldorf, Germany.
Italy, Adler & Eisenschitz, Milan.

Sense of Satisfaction Pervading the FLAT TURRET LATHES



Work from the bar turned out on the Flat Turret Lathe.

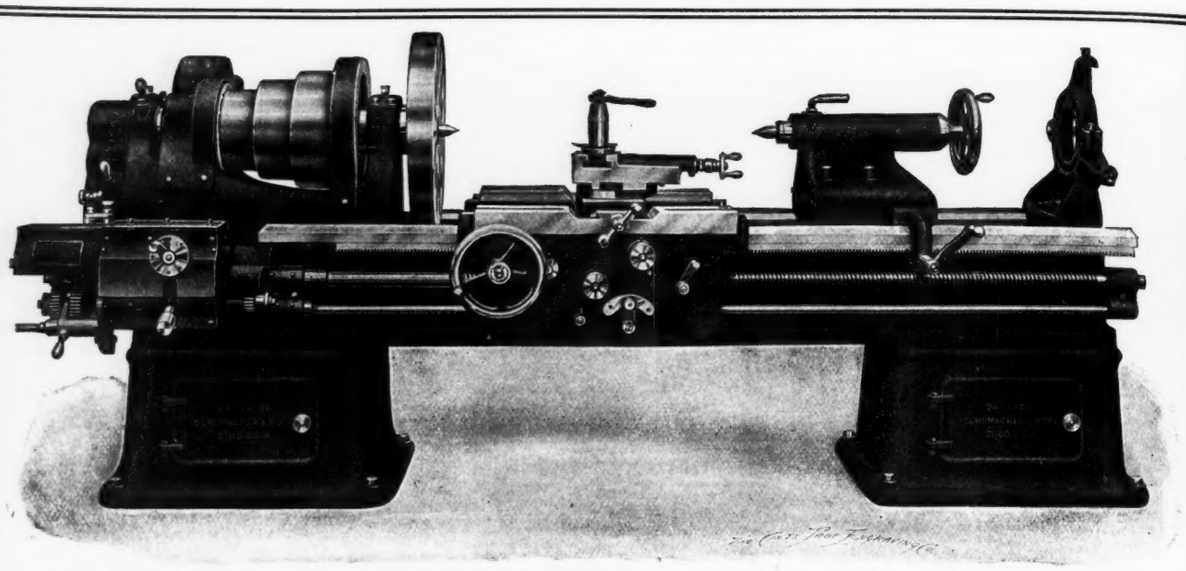
We just mention a few of the reasons to give you a line on its up-to-dateness, but we will be glad to explain fully if you are interested. We make a guarantee as to the percentage of saving the Flat Turret Lathe will effect—and an individual estimate is at your service if you will permit us to send a representative to your plant.

More than 5000 Flat Turret Lathes are in use in this country and abroad. Two sizes, 2 x 24 and 3 x 36.

COMPANY, **Queen Victoria St., London, E. C.**

France and Spain, Ph. Bonvillain and E. Ronceray, 9 and 11 Rue des Envierges, Paris.

Examples of chuck work.



Twenty-four inch Double Back Geared Instantaneous Change Gear Engine Lathe

WITH DOUBLE PLATE APRON

SCHUMACHER & BOYE

ENGINE LATHES
18" TO 48" SWING

CINCINNATI, OHIO, U. S. A.

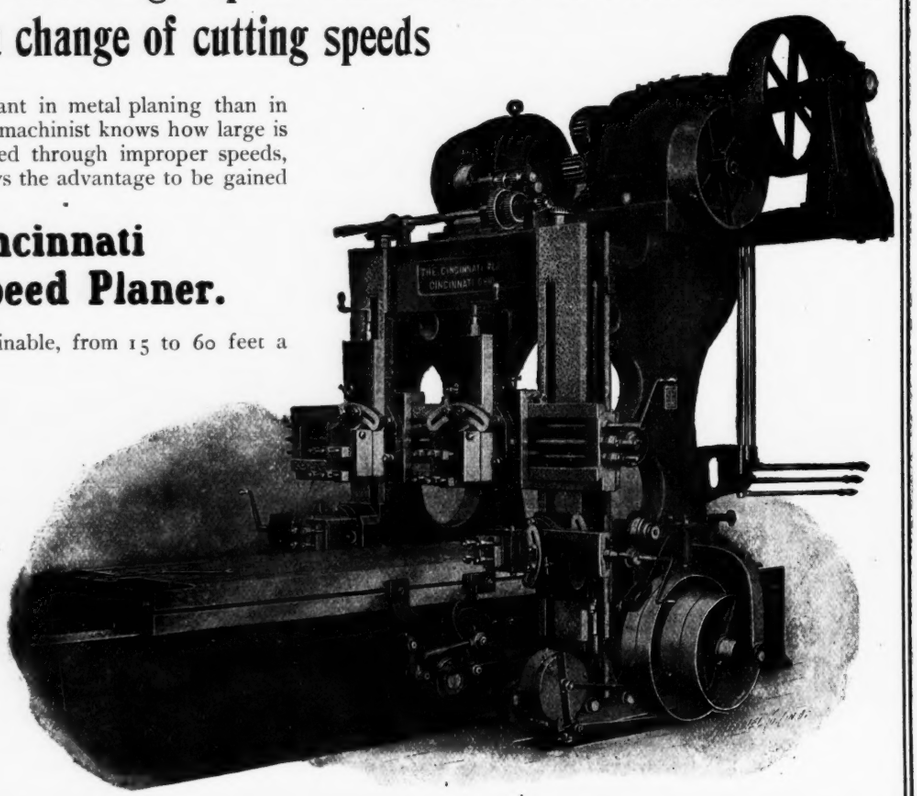
The Best Results from High Speed Steels cannot be obtained without ready access to a change of cutting speeds

This is perhaps more important in metal planing than in any other operation. Every machinist knows how large is the percentage of time wasted through improper speeds, and by the same token knows the advantage to be gained through using

The Cincinnati Variable Speed Planer.

Four changes instantly obtainable, from 15 to 60 feet a minute. Massive, powerful and saves 25 to 50 per cent. in time over the one-speed machine.

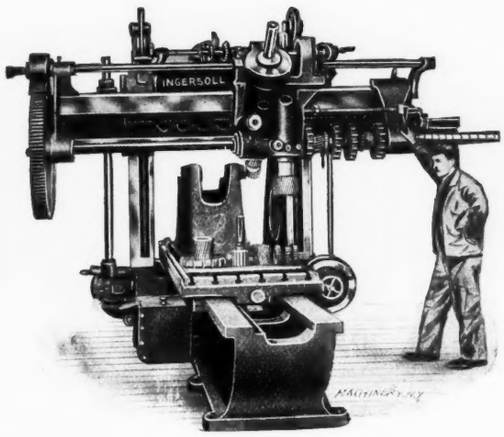
Write us for more points.



The Cincinnati Planer Co.

Cincinnati, Ohio

FOREIGN AGENTS: Ludw. Loewe & Co., Berlin and Paris. R. S. Stokvis & Zonen, Rotterdam, Holland. J. Lambercier & Co., Geneva, Switzerland Ing. Ercole Vaghi & Co., Milan H. W. Petrie. Ltd., Toronto, Montreal and Vancouver.

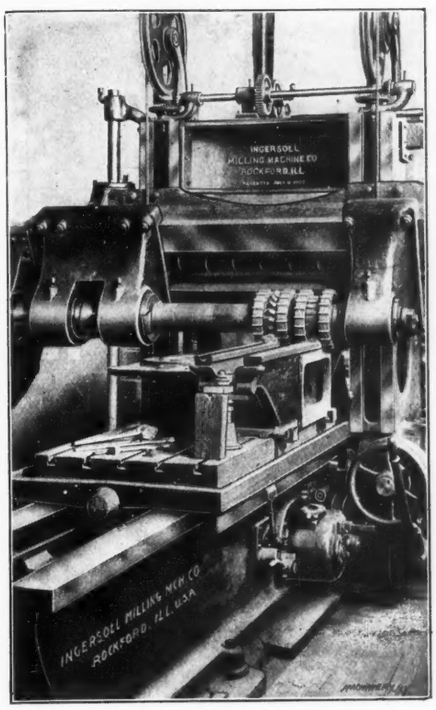


Practical Experience

Referring to top illustration: this machine carries three spindles on the rail, one horizontal, one in vertical position and one angular vertical spindle for milling cap bearing seats. Can you conceive of a more economical way of finishing Gas Engine Beds?

Referring to middle illustration: shows one of our machines milling grinder bases. Our twenty-two years experience in designing machines and methods for milling, is at your disposal. Send for our new catalogue No. 16.

Lower cut on page shows one of our Combined Horizontal and Vertical Spindle Milling Machines in operation in a railroad shop, fluting side rods. Note the middle arbor support between the cutters.



in Milling Machines for over 22 years in all kinds of work large or small.

Every combination of Spindles for light or heavy work.

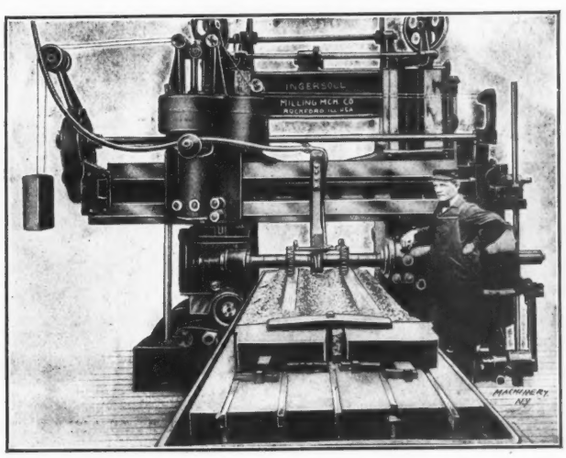
New Catalogue.

The Ingersoll Milling Machine Company

Rockford, Illinois, U.S.A.

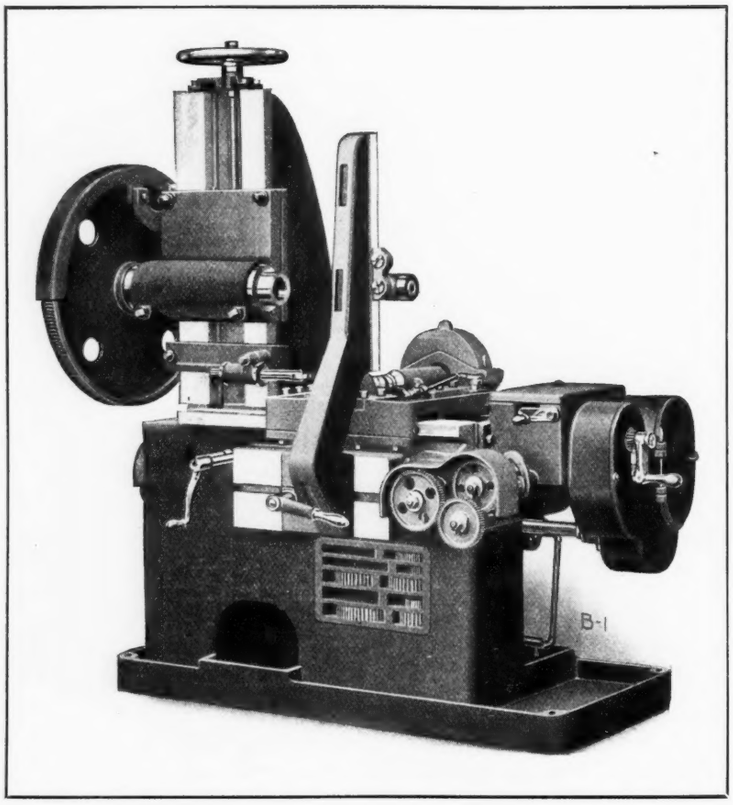
EASTERN BRANCH: Fulton Building, 50 Church Street, New York, Walter H. Foster & Co., Managers.

FOREIGN AGENTS—C. W. Burton, Griffiths & Co., London, E. C. F. G. Kretschmer & Co., Frankfort-on-Main, Germany. Fenwick Freres & Co., Paris, France. Andrews & George, Yokohama, Japan.



Automatic Gear Cutting Machine

For Spur Gears



This new machine is simple, compact and very rigid in construction, operation is rapid and all adjustments easily and quickly made. The power is transmitted through a single pulley running at a constant speed, the various changes for feeds and spindle speeds, as well as indexing, being obtained by change gears. All gibs are of the taper type, adjustable from the ends. All shafts and spindles are accurately ground, and are journalled in bronze bushings. The movements are all automatic, each being dependent on the preceding one and cannot take place until it has been completed.

Two sizes, Cutting Gears 36″ x 10″ and 48″ x 10″, respectively, 3 diametral pitch in cast iron, 4 pitch in steel.

Ask for special circular with detailed description.

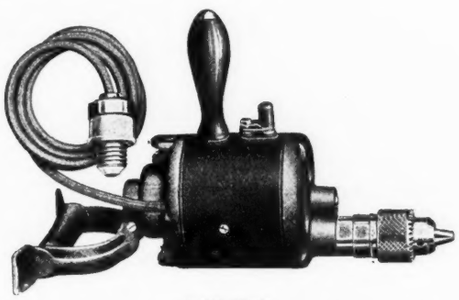
THE CINCINNATI SHAPER CO., Cincinnati, O.

AGENTS—Manning, Maxwell & Moore, Inc., New York, Chicago, Boston, St. Louis, Cleveland, Syracuse, Birmingham, Detroit, Milwaukee, Mexico City and Tokio. Brown & Zortman Mchy. Co., Pittsburg. The W. E. Shipley Machinery Co., Inc., Philadelphia. The National Supply Co., Toledo, O. Bailey-Smith Mchy. Co., San Francisco, Cal. Smith, Booth, Usher Co., Los Angeles, Cal. Hallidie Machinery Co., Seattle, Wash. Zimmerman, Wells, Brown & Co., Portland, Oregon. Robinson & Cary Co., St Paul, Minn. Vonnegut Hardware Co., Indianapolis, Ind. C. T. Patterson Co., Ltd., New Orleans, La. Salt Lake Hardware Co., Salt Lake City, Utah. A. Warden & Co., London, E. C. A. H. Schutte, Brussels, Cologne, Bilbao, Paris, Rotterdam. Schuchardt & Schutte, Liege, Milan, St. Petersburg, Vienna, Budapest, Berlin, Copenhagen, Stockholm. H. W. Petrie, Ltd., Toronto, Montreal and Vancouver.

IT'S BETTER TO BUY

A "Hisey" Electric Tool than to wish you had.

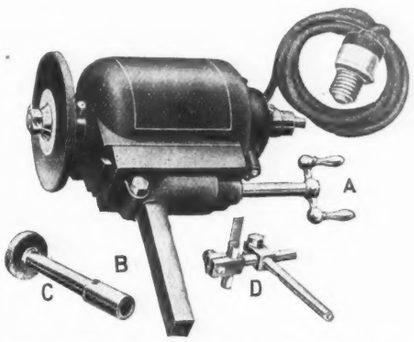
And you don't have to buy it until you try it, as we send them on approval with privilege of returning if not satisfactory. After once using they are found indispensable. Guaranteed most powerful and durable Electric Tools built. No complicated parts to get out of order. Air cooled. Catalog?



PATENTED.

The "Hisey" Electric Hand or Breast Drill.

6 sizes, ¼", ⅜", ½", ¾", ⅞", and 1¼" capacities. Weights, 8 to 38 lbs., respectively. Chuck arranged for close corner drilling. Speed can be changed while running. Extra side handle for use as breast drill. Screw feed for larger size drills. Also Portable Radial Drills to 2" capacity.



The "Hisey" Electric Tool Post Grinder.

For Grinding Centers, Cutters, Reamers, Dies, Rolls and Internal and Surface Grinding. Set in Tool Post of Lathe, Planer or Milling Machines. 4 sizes of ¼, ½, 1 and 2 H. P. Take them to the work. No bothersome connections to make.

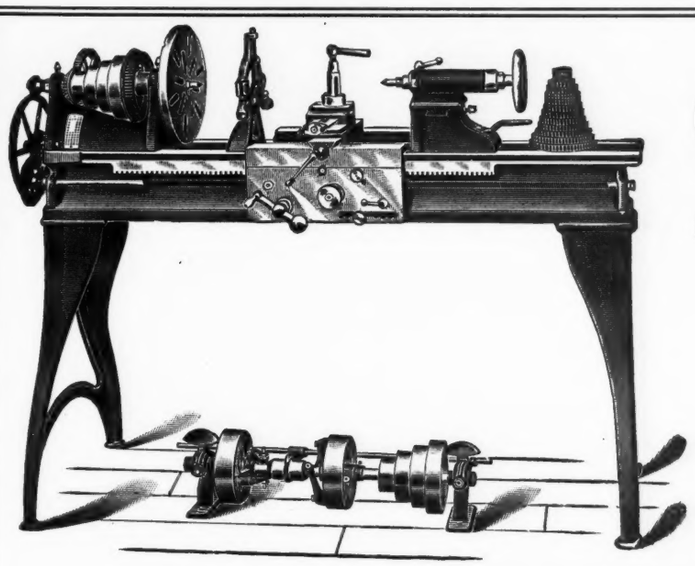
Bench Grinders -- Hand Grinders -- Internal Grinders to 36-in. Depth.

POWER FROM ANY LAMP SOCKET; DIRECT OR ALTERNATING CURRENT

THE HISEY-WOLF MACHINE COMPANY

New York Office, Fulton Building, 50 Church Street. **CINCINNATI, OHIO**

IN STOCK BY FOREIGN AGENTS: **Chas. Churchill & Co.**, London, Birmingham, Manchester, Glasgow. **Schuchardt & Schutte**, Berlin Vienna, St. Petersburg, Stockholm. **Fenwick, Freres & Co.**, Paris, Brussels, Milan, Barcelona. **Mitsui & Co.**, Japan.



TRADE W.F. and J.G. MARK

The "BARNES" LATHES

9 in. to 13 in. Swing

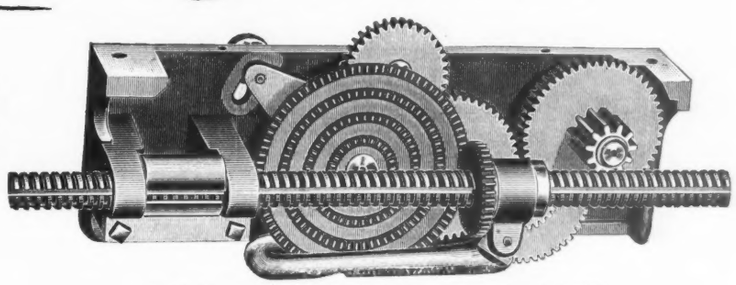
No. 13. 13-in. Swing Lathe

Look at the positive feed in the carriage; consider the variety of feeds without change of gears; a strong feed and not equaled by any lathe of its size; has compound rest and automatic cross feed; has hollow spindle and set-over tail stock; is back geared and cuts right or left hand screws. Every gear is cut from solid metal; the best of workmanship, accurate and practical, strong and convenient in operating.

PRICES:

With Countershaft, 5 ft. Bed	$167.00
6 " "	177.00
7 " "	187.00
8 " "	197.00
10 " "	217.00

Send for Lathe Catalog.

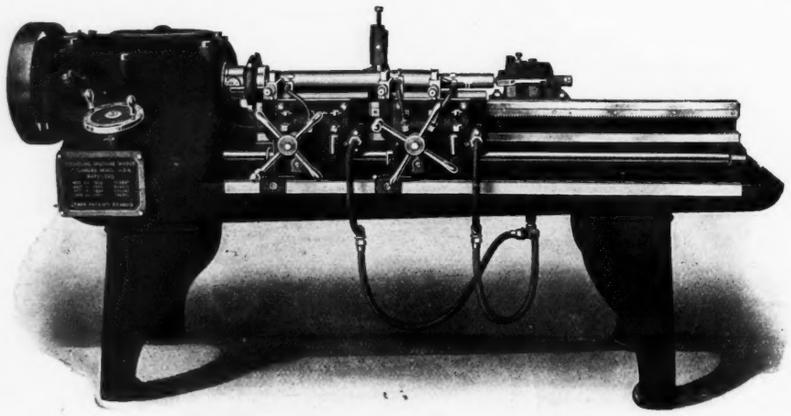


Feed Arrangement in Tool Carriage. Pat. May 6, 1902.

SOLE MANUFACTURERS

W. F. & JNO. BARNES CO., 231 Ruby St., (Established 1872) ROCKFORD, ILL.

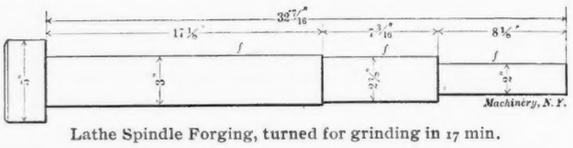
The Lo-swing Lathe



The economy and precision with which this machine operates is a conspicuous advantage. A specialized tool, handling work within certain limits only, it is still adapted for a wide variety of work.

All bar-stock work within its range, straight or taper, shoulder work or long forgings come within its scope, and can be turned in less time, with more accuracy, with greater ease than with any other machine.

Glad to prove our claims if you will allow us.



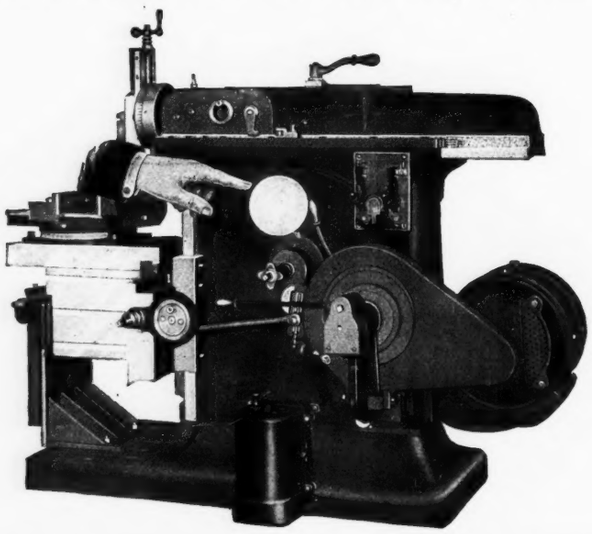
Lathe Spindle Forging, turned for grinding in 17 min.

FITCHBURG MACHINE WORKS, Fitchburg, Mass., U.S.A.

FOREIGN AGENTS—P. & W. Maclellan Ltd., Glasgow. Henry Kelley & Co., Manchester. Alfred H. Schutte, Paris, Bilbao, Barcelona, Portugal. M. Koyemann, Dusseldorf (for Germany, Belgium, Holland and Switzerland). Schuchardt & Schutte, Vienna. Adler & Eisenschitz, Milan.

The Vital Point in Shaper Construction is the Crank

24-inch Shaper with Silent Chain Drive.



We make a full line of regular shaper attachments.

Special attachments made to order.

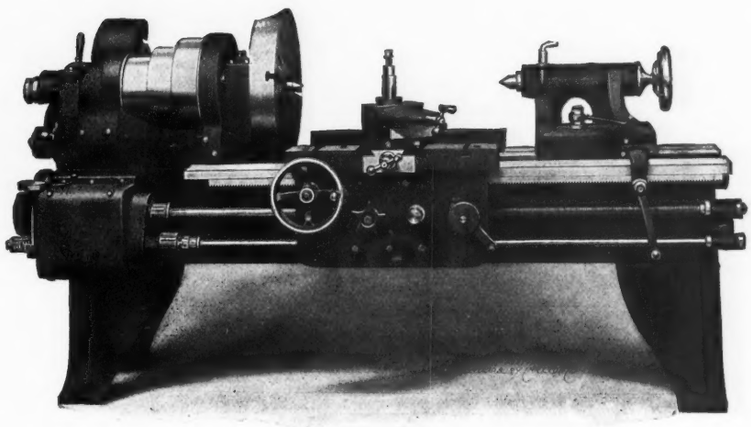
The Stockbridge Patented Two-Piece-Crank Produces Results.

ASK FOR ILLUSTRATED CIRCULAR

STOCKBRIDGE MACHINE CO., Worcester, Mass., U.S.A.

WHITCOMB

Engine Lathes



Increased Facilities for Operation

Rigid design and unusual power are distinguishing features of our new line of Engine Lathes. The beds are of improved box pattern, deep, heavy and very stiff. Power is obtained through double back gears and a three step cone carrying a wide belt. Changes of speed may be obtained even more easily than in the ordinary lathe. The range of feeds is very wide, and at all times five changes of feed can be instantly obtained by the simple movement of a conveniently placed lever. The capacity of these lathes for high class work, their convenience, durability and economic use of high speed steels, put them in the front rank among manufacturing tools.

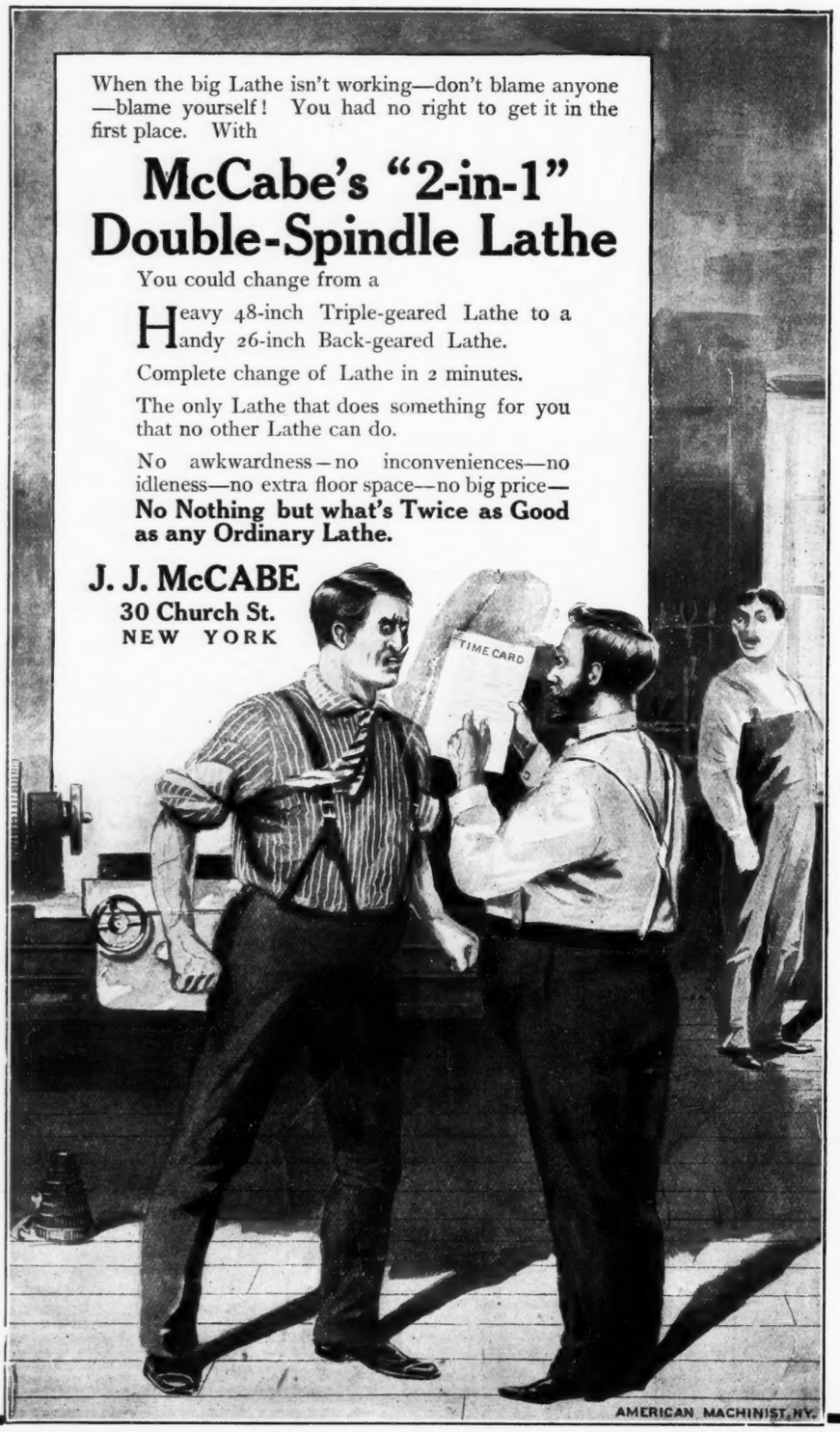
Ask for new Engine Lathe Catalogue.
We also build a full line of Second Belt Planers.

Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.

AGENTS: Hill, Clarke & Co., Boston and Chicago. Vandyck Churchill Co., New York and Philadelphia. Thomas & Lowe Machinery Co., Providence, R. I. C. H Wood Co., Syracuse, N. Y. McDowell, Stocker & Co., Chicago, Ill. Marshall & Huschart Machinery Co., St Louis, Mo. Patterson Tool and Supply Co., Dayton, Ohio and Indianapolis, Ind. J. L. Osgood, Buffalo, N. Y. H. B. Perine, Seattle, Wash. Pacific Tool and Supply Co., San Francisco, Cal. Somers, Fitler & Todd Co., Pittsburg, Pa, Chas A. Strelinger Co , Detroit, Mich. Zimmerman-Wells-Brown Co., Portland, Ore. L. Booth & Sons, Los Angeles, Cal. C. W. Burton, Griffiths & Co., London, England. Fenwick Freres & Co., Paris, France. Ludw. Loewe & Co., Berlin, Germany. De Fries & Co., Dusseldorf, Germany. Wilh. Sonesson & Co., Malmo, Sweden. Van Riestchoten & Houwens. Rotterdam, Holland. Williams & Wilson, Montreal, Canada. A. R. Williams Machinery Co., Toronto, Canada.

BLAISDELL

Where the blame lies?


When the big Lathe isn't working—don't blame anyone —blame yourself! You had no right to get it in the first place. With
McCabe's "2-in-1" Double-Spindle Lathe
You could change from a
Heavy 48-inch Triple-geared Lathe to a Handy 26-inch Back-geared Lathe.
Complete change of Lathe in 2 minutes.
The only Lathe that does something for you that no other Lathe can do.
No awkwardness—no inconveniences—no idleness—no extra floor space—no big price—
No Nothing but what's Twice as Good as any Ordinary Lathe.
J. J. McCABE
30 Church St.
NEW YORK
TIME CARD
AMERICAN MACHINIST, N.Y.

FILES OF ENDURANCE

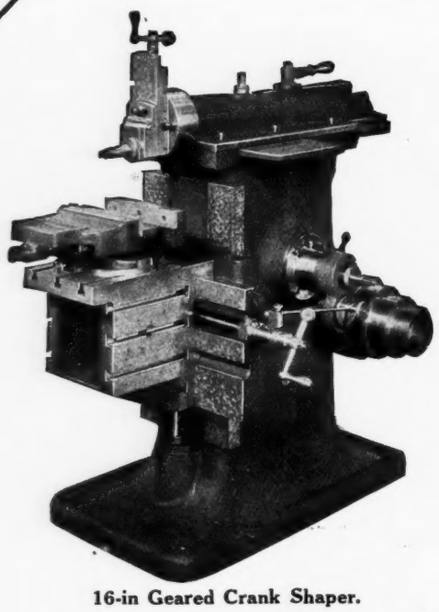
BITE SHARP
AND LONG

NICHOLSON
FILES

Nicholson Files are made for specific purposes and fill them.

Unexcelled in Cutting Power, Durability and Uniformity.

NICHOLSON FILE CO.
PROVIDENCE R. I., U. S. A.



16-in Geared Crank Shaper.

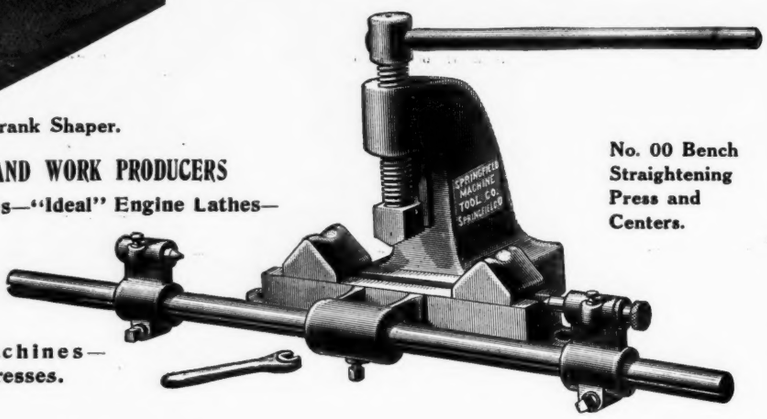
THE MAIN LINE

For Shop Equipment is the Springfield Line of Machine Tools.

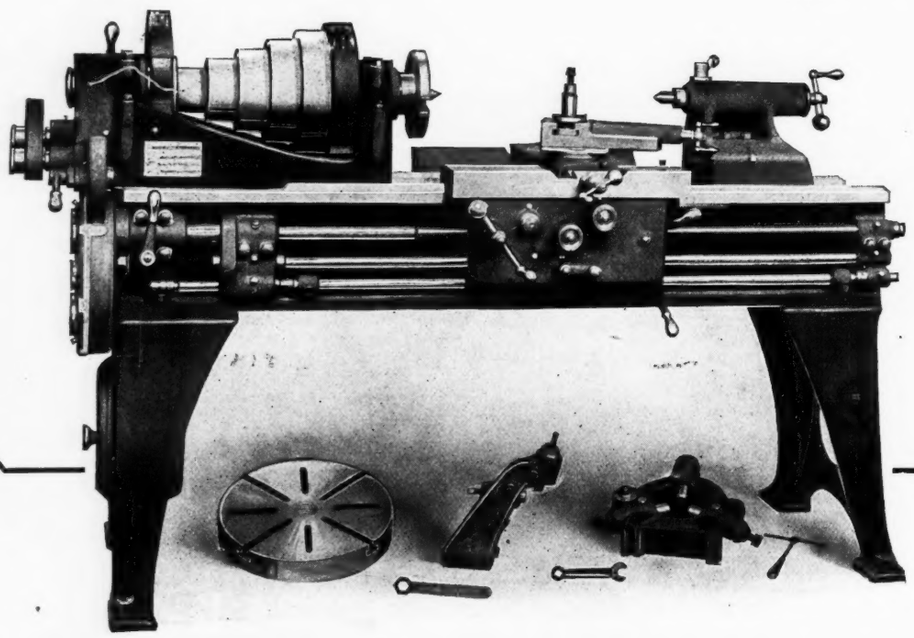
They are the "dollar-for-dollar-and-a-dollar-besides" class of machines; designed for service, fitted with all improvements, built in a modern shop under best conditions and run through in large lots so the price is easy.

COST REDUCERS AND WORK PRODUCERS

Standard Engine Lathes—"Ideal" Engine Lathes—Friction Geared Head Lathes—Brass Finishing, High Speed and Shafting Lathes—Crank Shapers—Axle and Spindle Boring Machines—Bench Straightening Presses.



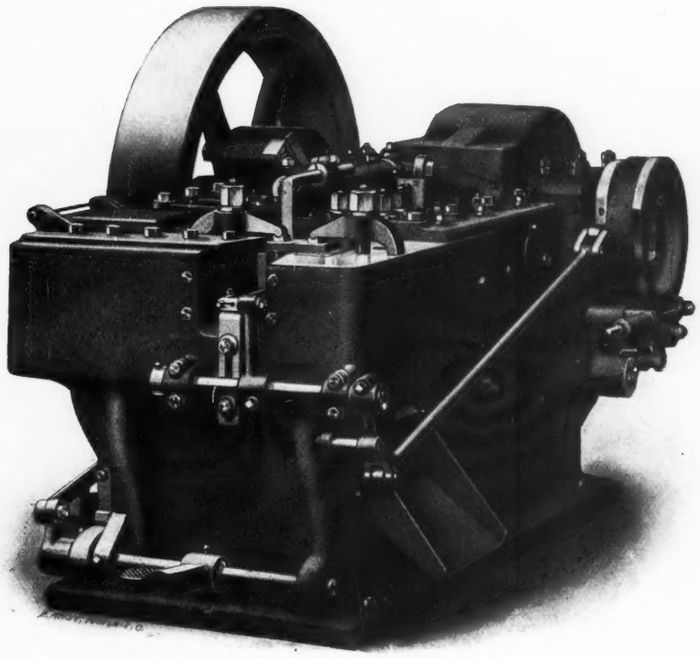
No. 00 Bench Straightening Press and Centers.



THE SPRINGFIELD MACHINE TOOL CO.

631 Southern Avenue, SPRINGFIELD, OHIO, U. S. A.

Agents for Chicago, McDowell, Stocker & Co. Agents for Italy, Ing. Vaghi, Accornero & Co., Milan.
Agents for Germany, L. Loewe & Co., Berlin.



The National New Wedge Grip Bolt and Rivet Header

has exceeded even our fondest expectations, and is worthy of the careful investigation of all bolt machine users.

The wedge prevents any "rocking" or springing open of the grip dies, and it is unnecessary to overgrip (hence batter) the dies to secure the required amount of gripping pressure. *As a result the dies will last from three to four times as long as in the regular toggle headers.*

Fins, also, are practically eliminated, and this combined with the die saving makes the installation of this machine a plain business proposition.

One customer has ordered twenty-four.

We build complete equipment for Bolt and Nut Plants.

Our aim is to build our machines better, if anything, than need be.

Hence, we are in position to furnish only the best.

THE NATIONAL MACHINERY CO
TIFFIN, OHIO, U.S.A.

FOREIGN AGENTS:
Buck & Hickman, Ltd., London, Birmingham, Manchester, Glasgow.
De Fries & Co, Dusseldorf, Berlin.
Fenwick, Freres & Co., Paris, Liege, Brussels.
White, Child & Beney, Vienna, Budapest.
Takata & Co., Tokio, Japan.
A. B. Horn, Havana, Cuba.
V. Lowener, Stockholm, Copenhagen, Malmo.
Bevans & Edwards Propty. Ltd., Melbourne, Australia.

CARD

There are Taps and Taps
But for Service, Durability,
Strength and Quality

Buy

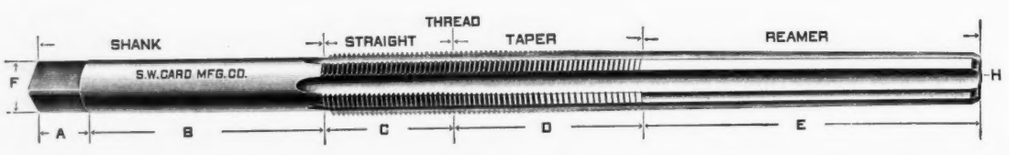
CARD TAPS

All standard styles and sizes in stock—special taps to order.

Send for new
Catalogue of Screw
Cutting Tools.

S. W. Card Mfg. Company

MANSFIELD, MASS.
U. S. A.



ACCURATE MACHINE TOOLS

ENGINE LATHES, 10" to 42" Swing
CUTTING OFF MACHINES, 3" to 6"
UPRIGHT DRILLS
KEY SEATERS
TURRET LATHES

Economy in manufacturing costs is secured by using our **26" Turret Boring, Forming, Threading and Turning Lathe.**

Write for particulars.

THE W. P. DAVIS MACHINE CO.,
ROCHESTER, N. Y., U. S. A.

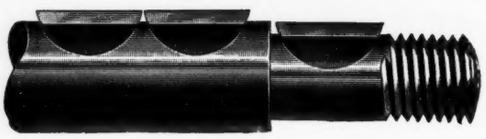
Rough Out Your Gear Teeth with Eberhardt's Patent New "Stepped Style" Roughing Cutters

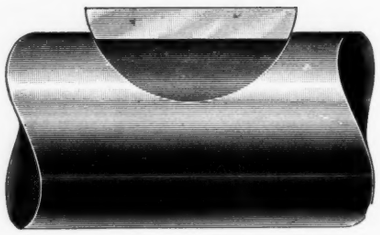
The tops of the teeth are cut away on alternate sides and reduce the width of the cut taken by the points of the teeth, thus saving the cutter where it ordinarily wears out first, and cutting to the full depth of the finished tooth space, relieve the finishing cutter of this part of the work. A good roughing cutter is just as essential as a good finishing cutter and the new Eberhardt possesses every advantage. With it the chips are broken up, so less power is required, faster feeds are permitted, the maximum amount of stock can be removed and the cutting edges are better lubricated. *Write us.*

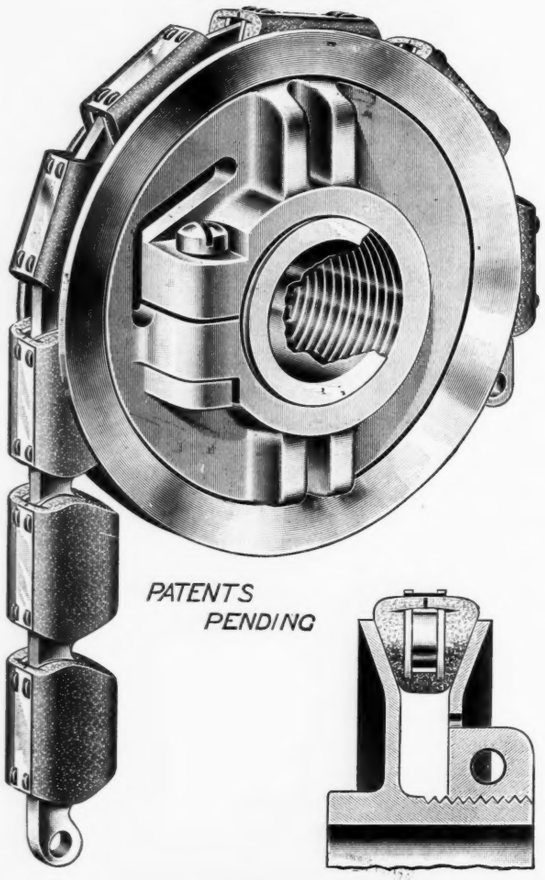
GOULD & EBERHARDT
"HIGH DUTY" SHAPERS
AUTOMATIC GEAR AND RACK CUTTING MACHINERY
ESTABLISHED 1833 NEWARK, N.J. U.S.A.

New "Whitney" Chain Belt

For Cooling Fans, Oiling Devices, Motorcycles, Etc.





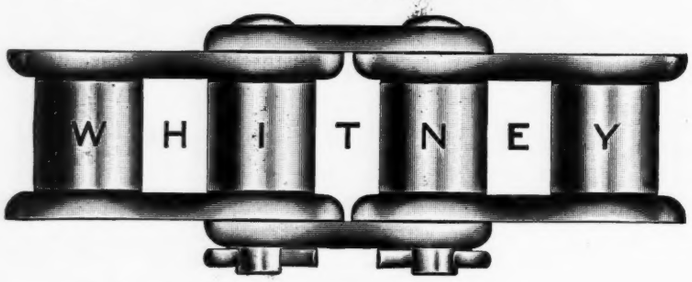


PATENTS PENDING

If you are not taking advantage of the Woodruff Patent System of Keying it will pay you to investigate.

Better results and a great saving in cost.

We carry 95 regular sizes of Keys and Cutters in stock for immediate delivery.



"Whitney" Patent Cotter Detachable Roller Chains

Made a fine record in the Briarcliff Road Race.

THE WHITNEY MFG. COMPANY,
Hartford, Conn.

New York City, May 2, 1908.

Gentlemen—The uniform strength of an automobile driving chain is one of the important requisites in a speed contest.

The "Whitney" Chains which formed a part of the equipment on our three "Stearns" Cars in the recent Briarcliff Stock Car Road Race, showed their superiority by coming through this exceptionally difficult contest without the sightest evidence of the terrific strain which they had undergone. Our "Stearns" Cars made an exceptional showing in this race, and we attribute our success in no small degree to the entire absence of chain trouble.

Our experience in previous contests has taught us that a faulty chain can cause a lot of trouble.

We therefore take this opportunity to express the satisfaction which we feel at the manner in which "Whitney" Chains demonstrated their worth.

Your very truly,

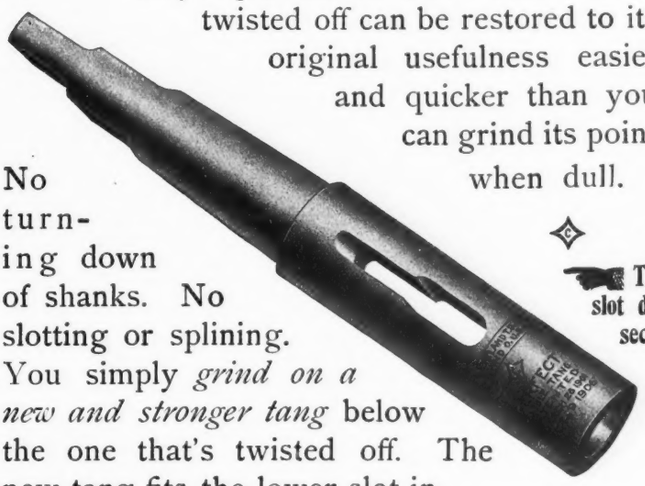
WYCKOFF, CHURCH & PARTRIDGE,
By C. F. Wyckoff, President.

The Whitney Mfg. Company, Hartford, Conn.

Ready for the scrap-heap.

From the Scrap Heap to the Drill Press

Any taper shank drill with its tang twisted off can be restored to its original usefulness easier and quicker than you can grind its point when dull.



The lower slot drives the second tang.

No turning down of shanks. No slotting or splining. You simply *grind on a new and stronger tang* below the one that's twisted off. The new tang fits the lower slot in

"PERFECT Double Tang" SOCKETS

(PATENTED)

Made as Rough, Fitted and Shell Sockets. They are simple, "fool-proof," and inexpensive; have no parts to get out of order, and will *fit any spindle* having a regular taper hole. With them you can

END YOUR TANG TROUBLES

RECLAIM YOUR SCRAP-HEAP

Write for "D.T." Circular and discounts.

Ready for the drill-press.

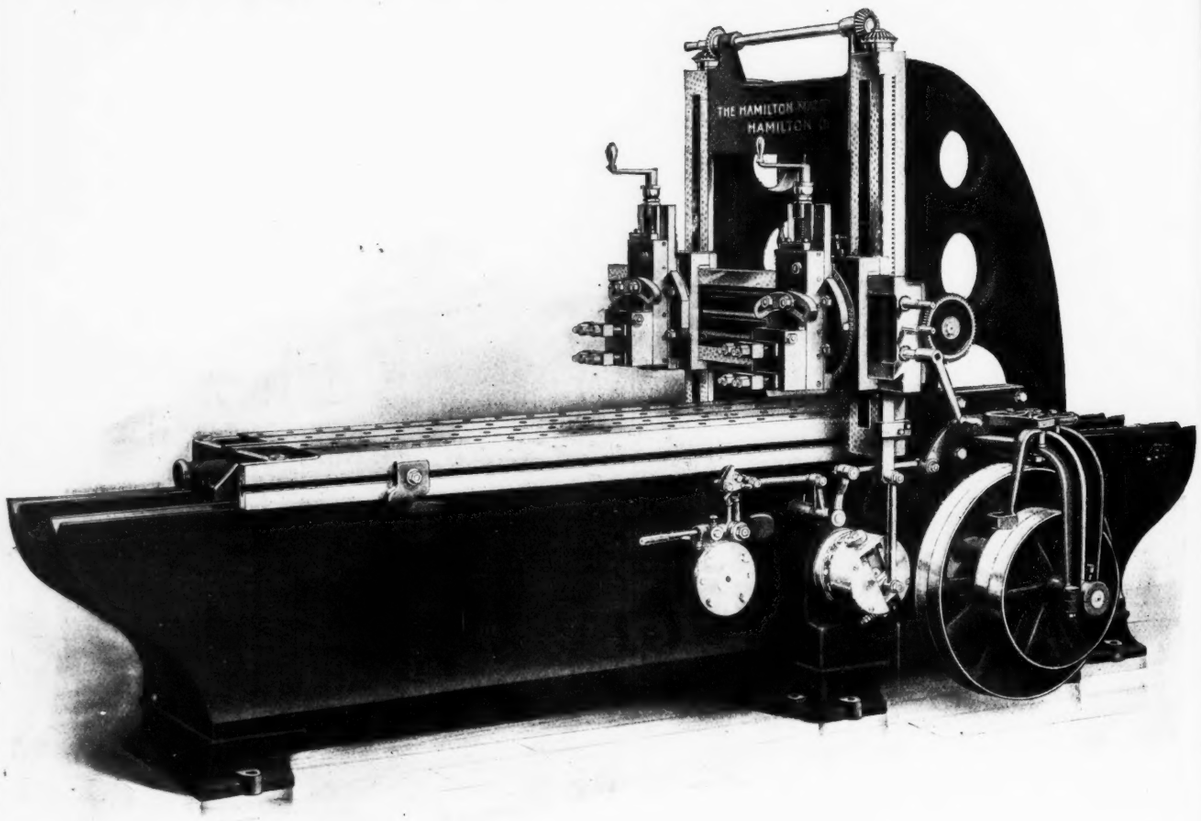
The CLEVELAND Twist Drill Co.

New York CLEVELAND, OHIO Chicago

"HAMILTON" TOOLS

THE KIND THAT SATISFY

Heavy and Powerful Machines of the Latest Design, Accurately Constructed, and Especially Arranged for Rapid and Convenient Operation.



30" x 30" Spur Geared Planer.

A complete line of high grade

LATHES, PLANERS, SHAPERS, UPRIGHT AND RADIAL DRILLS

Belt or Motor Driven as desired.

Our printed matter explains their advantages. Write for it today.

The Hamilton Machine Tool Co.

HAMILTON, OHIO, U. S. A.

Cleveland Store: 202-204 St. Clair Avenue, N. E.
W. H. Welsh, Manager.

Philadelphia Store: 48-50 N. Sixth Street
E. L. Frazer, Manager.

FOREIGN AGENTS

Australia—Thos. McPherson & Son.....Melbourne
Australia—Leslie & Co.....Perth
Austria—Maschinen-Technisches Bureau Ing. Rudolf Salzer.Vienna
Canada—Williams & Wilson.....Montreal
Cuba-J. P. Adams Engineering Co.....Havana
Denmark—V. Lowener.....Copenhagen
France-Glaenzer, Perreaud & Thomine.....Paris
Germany—Hermann Haelbig.....Dresden A-3
Holland—Van Rietschoten & Houwens.....Rotterdam
Italy—Ing. A. Baldini & Cie.....Pontedera
Japan—Mitsui & Co.....Tokio
Mexico—Escude & Potts.....Mexico City
Norway—V. Lowener's Maskinforretning Sverre Mohn...Christiania
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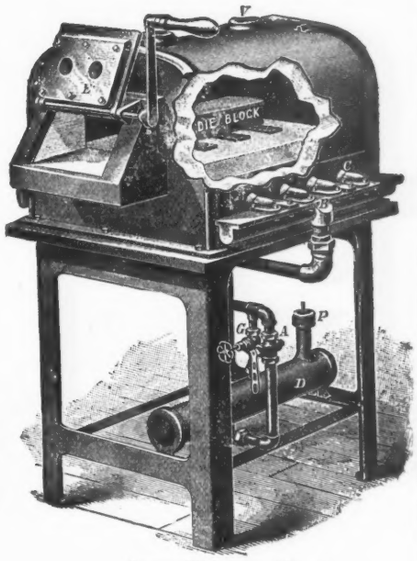
Sweden—Akt. B. A. Hjorth & Co.....Stockholm
Switzerland—Spoerri & Co.....Zurich

WHAT is worth doing at all, is worth doing well—but it's more than worth while to do your Hardening and Tempering right—it's worth good, hard Cash!

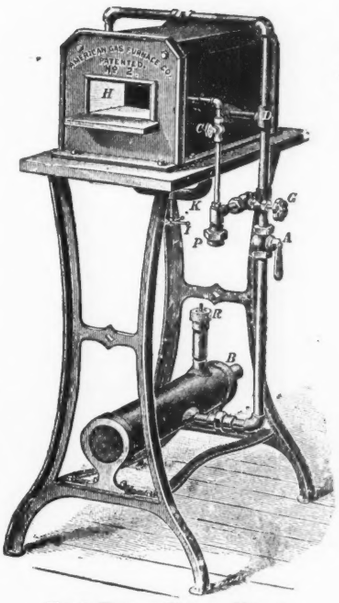
The coal or coke furnace that can be absolutely relied on has yet to be made. More good steel has been spoiled in the heating, than would pay for all the Gas Furnaces now in existence. More good dies have been cracked, warped out of shape and utterly ruined by the coal or coke fires than the toolmaker cares to remember.

Modern High Speed Steels make a proper equipment for heating, hardening, tempering, etc. a necessity, and we shall be glad to send a set of American Gas Blast Furnaces on trial. *No expense to you* unless "they *make good.*"

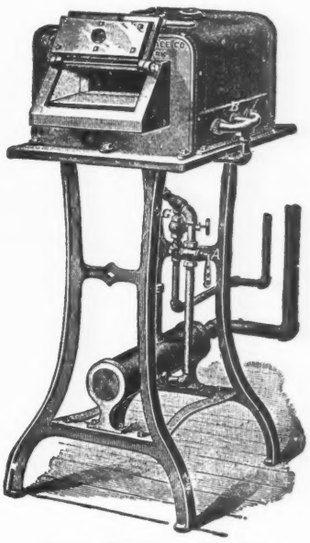
Catalogue is also at your service.



Oven Furnace No. 1
A size adapted for general hardening and annealing.

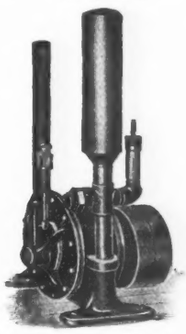


Tool Room Forge No. 1



Oven Furnace No. 16
Much used for light work, cutters, dies, tools, etc.

Gas Forge No. 7
For Cutlery, etc.

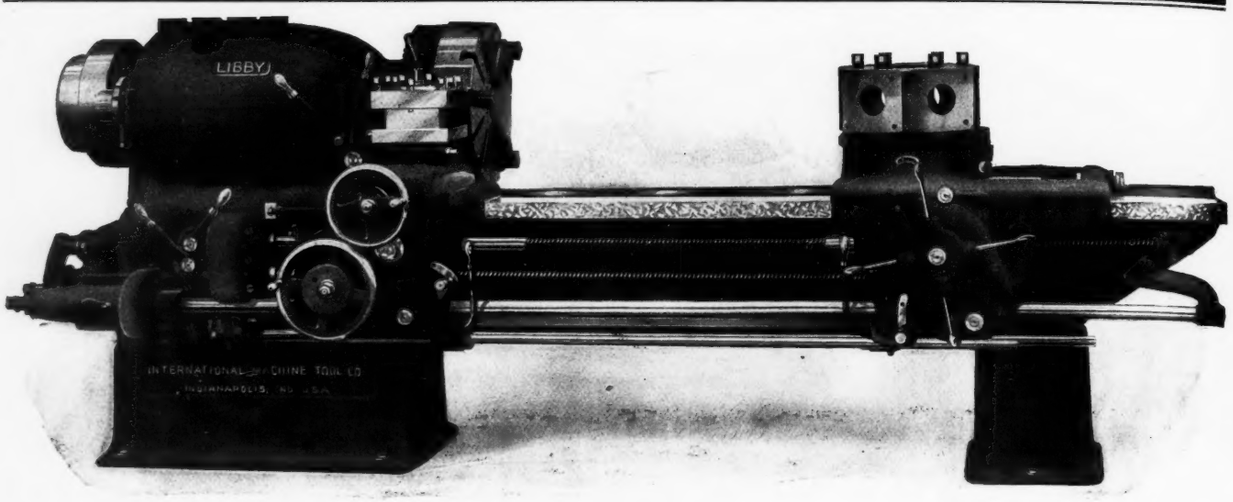


Positive Pressure Blower

AMERICAN GAS FURNACE COMPANY

24 John Street, New York

AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow. Schuchardt & Schutte, Berlin, Vienna, St. Petersburg, Stockholm. Alfred H. Schutte, Cologne, Brussels, Milan, Bilbao.
Chicago, Machinists' Supply Co., 16-18 South Canal St., St. Louis, W. R. Colcord Co., 811-823 North Second St., and Gas Companies in nearly all Cities and Manufacturing Towns.



The Change from Belt to Motor Drive can be so easily made on the

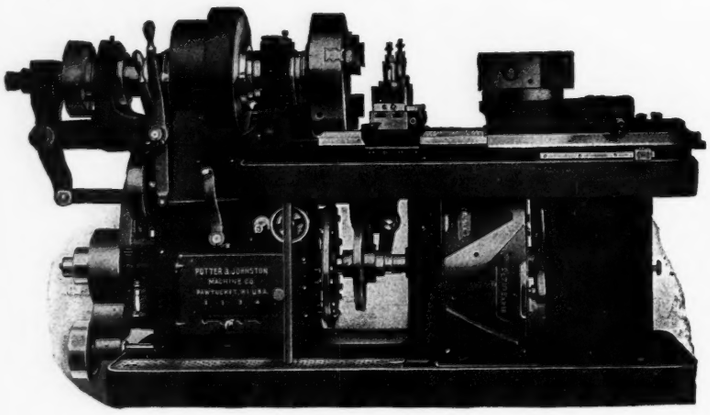
"Libby" Full Swing Side Carriage Turret Lathe

that it is *accomplished* in less time than it takes to arrange preliminaries in the ordinary machine and at a very small cost. No need to change the head-stock, any 2 to 1 type of motor can be used. This new lathe will reduce production costs on a wide range of duplicate machined parts and is especially adapted for heavy service.

Ask for Bulletin giving special "Libby" advantages.

The International Machine Tool Co., Indianapolis, Ind., U. S. A.

One Attendant Operates 4 to 6 MANUFACTURING AUTOMATICS



8½ x 16 Manufacturing Automatic.

All cutting operations are performed entirely automatically.

Handle duplicate parts from castings of iron, bronze or steel, also forgings, up to 20″ diameter. Bar work up to 6″ diameter.

Send us your drawings or samples for production estimates.

ALSO

Universal Shapers

POTTER & JOHNSTON, Pawtucket, R. I.

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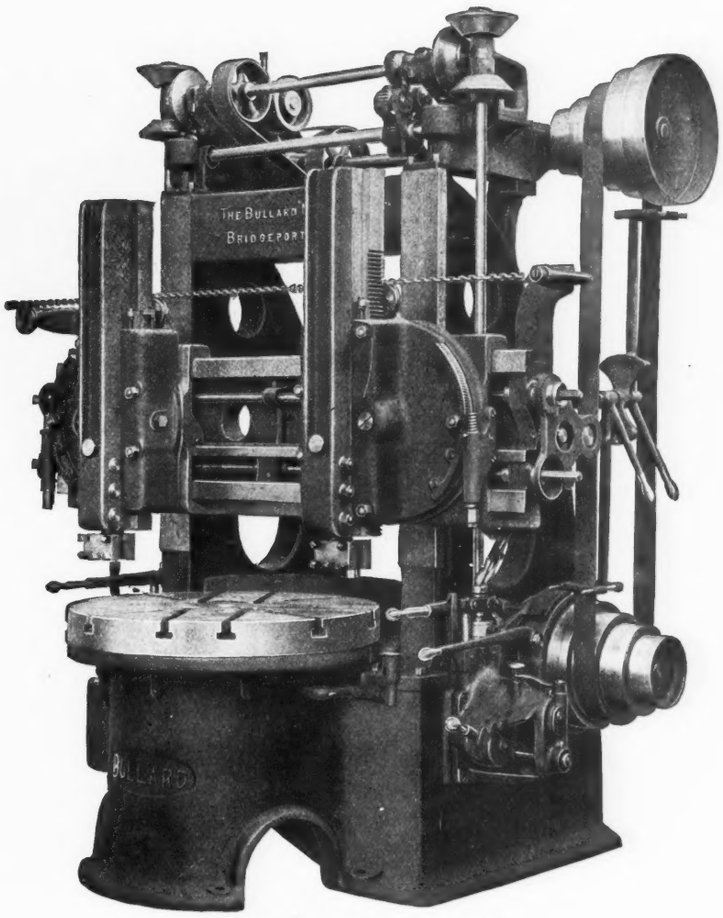

42" Rapid Production Mill.

Taken as a Whole, or Taking Each Part Separately,
There is Absolutely No Equal to

THE BULLARD MILL

As a whole it has the necessary weight and strength to endure the heaviest work that can be demanded of it. All the modern high-speed requirements have been met in the the most approved and practical way.

Taking each part separately you will find that its proportions are exactly suited to its functions. You will understand how the "Bullard" gains its extreme ease of operation, its exceptional capacity for quantity and quality of output, and its great durability.

Let us tell you all about the "Bullard" Mill. It pays to know.

The Bullard Machine Tool Co.

BRIDGEPORT, CONN., U.S.A.

AGENTS—Marshall & Huschart Mchy. Co., Chicago, Ill. The Motch & Merryweather Mchy. Co., Cleveland, Ohio. Chas. G. Smith Co., Pittsburg, Pa., The C. H. Wood Co., Syracuse, N. Y., Pacific Tool & Supply Co., San Francisco, Cal. Williams & Wilson, Montreal, P. Q. Chas. Churchill & Co., Ltd., London, E. C., England. Fenwick Freres & Co., Paris. Heinrich Dreyer, Berlin, Germany. Landre & Glinderman, Amsterdam, Holland. A. R. Williams Mchy. Co., Toronto, Winnipeg and Vancouver.

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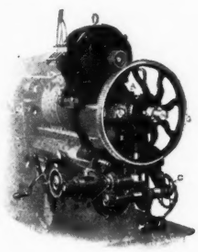

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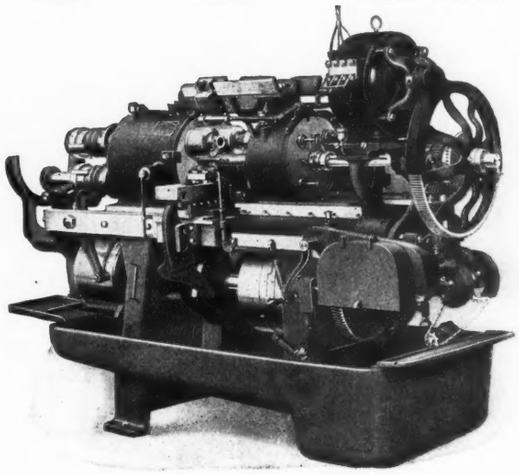

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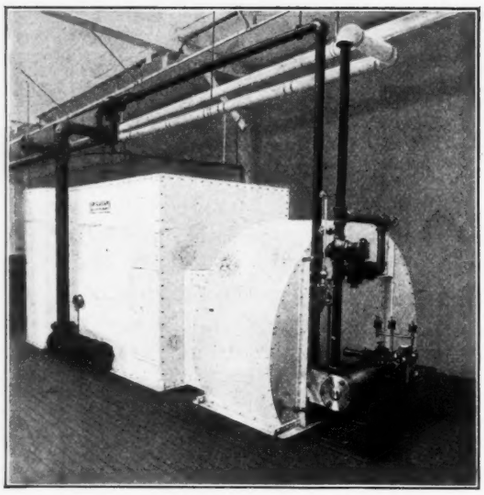

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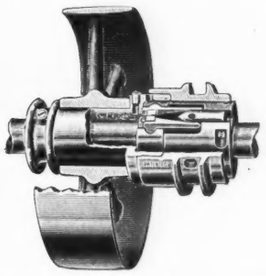

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BERRY & PARKER, Erie, Pa., U.S.A.

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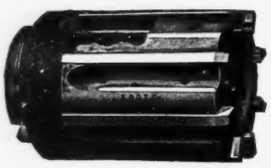

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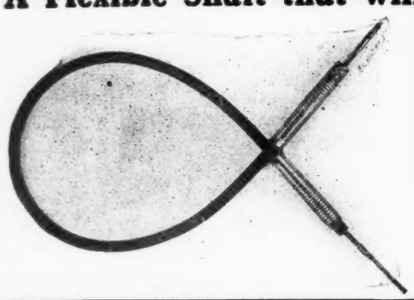

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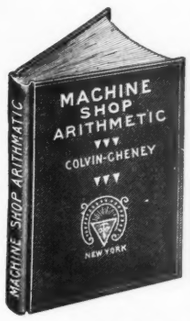

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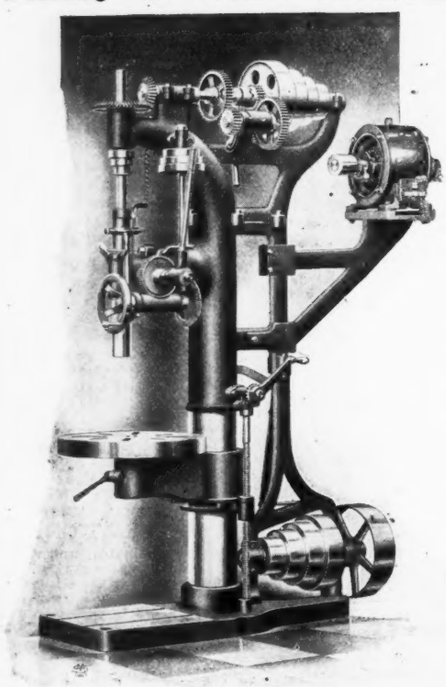

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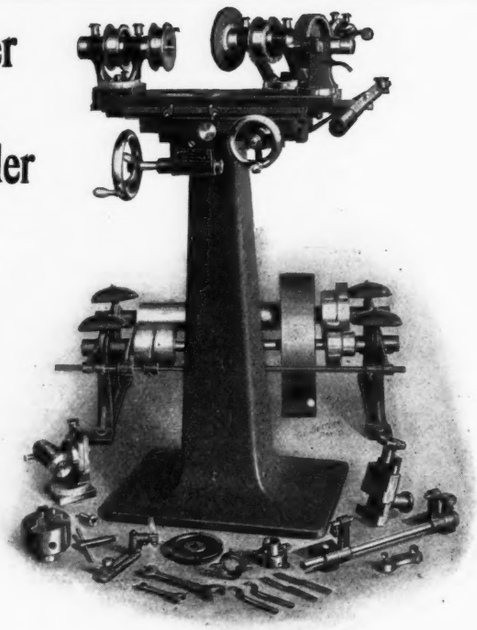

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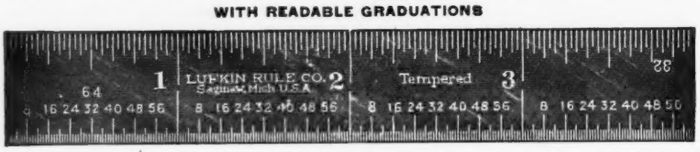

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Curtis & Co. Mfg. Co., St. Louis, Mo.
Northern Engineering Works, Detroit, Mich.
Shepard Elec. Crane & Hoist Co., Montour Falls.
Stow Flexible Shaft Co., Philadelphia, Pa.

Hydraulic Machinery.
Chambersburg Engineering Co., Chambersburg, Pa.
Niles-Bement-Pond Co., New York.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
Watson-Stillman Co., New York.
Williams, White & Co., Moline, Ill.

THE
THERMIT
WELDING PROCESS

Repairs broken steel crank shafts, locomotive frames, connecting rods, sternposts and rudder frames of steamships IN PLACE. No need of removing the broken part.

"THERMIT" is a mixture of finely divided aluminum and iron oxide which, upon ignition, reacts to form superheated liquid steel at a temperature of 5400° F. The crucible in which the reaction takes place and the other appliances are easily transportable, and the process permits of the weld being performed anywhere without the aid of outside power.

Write for Pamphlet 18-A.

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432-436 Folsom St., San Francisco 103 Richmond St., W., Toronto, Can.

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Sharpens Files as easily and successfully as your drills or other tools are sharpened.

Don't throw away your files because they are dull—they can be sharpened from two to six times and *save 90% on your file appropriation.*

Worth investigating? Just ask us.

American File Sharpener Co., 287 Broadway, New York

Lea-Simplex Cold Metal Saw
ASK FOR CATALOGUE AND PRICES
LEA EQUIPMENT CO., 136 Liberty St., New York City

THE COST OF BLUE PRINTS
Case No. 4

This firm manufactures twist drills, taps, reamers, etc. They make their blue prints direct from Crane's bond paper instead of tracing cloth as is the usual custom.

They were using an Electric Blue Printing Machine on which it was necessary to make three exposures to secure a clear print, which of course run their electric current cost very high and the work was so slow the machine could not keep up with their requirements.

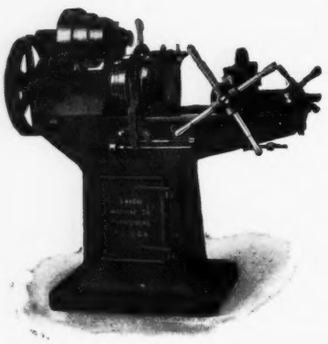
The Buckeye Electric Blue Printing Machine with its perfect contact, 2000 c-p. photo engraving lamp and accurate speed control was furnished on 30 day's trial upon the assumption that it would make prints from bond paper as readily as from tracing cloth.

The time of exposure was set at two minutes, afterwards reduced to 1¾ and the prints resulting were perfect in every respect. As the best their old machine could do was six minutes, it was sold and the "Buckeye" was retained. It continues to do their work perfectly and is not busy more than half the time.

When purchasing a blue printing machine care should be exercised in selecting one of unquestionable merit.

There are over 400 "Buckeyes" in daily operation,

BUCKEYE ENGINE COMPANY, - SALEM, OHIO



Threads to Cut?

Bolt threading, small pipe, special work of any kind? Do it on the "Landis." The improved Die in the Landis Bolt Cutter has solved the thread cutting problem. It increases production, insures accuracy, outwears any other die ten times over, has positive lead, correct clearance, a permanent throat, requires neither hobbing, annealing or retempering, covers a wide range of special work, and the same chasers will cut right or left hand threads.

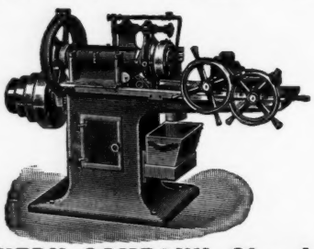
Let us send our latest booklet.

LANDIS MACHINE CO.
WAYNESBORO, PA.

Schuchardt & Schutte, 34 Victoria St., Westminster, London, Sole Agents for Gt. Britain, Ireland and British Colonies. Schuchardt & Schutte, 9 Kiangase Road, Shanghai, Sole Agents for China and Japan. Adler & Eisenschitz, Milan, Sole Agents for Italy.

Bolt Threaders, Headers and Nut Tappers.

Write to us for anything you want in this line.



EUROPEAN AGENTS:

Schuchardt & Schutte, Berlin, Vienna, Stockholm and St. Petersburg.

A. H. Schutte, Cologne, Paris, Brussels, Liege, Barcelona and Milan.

C. W. Burton, Griffiths & Co. London.

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Office, 1125 Hamilton Street.

You Can't Beat Diamond Chain

If you want efficient short drives,

If you haven't time or money to waste on belt dressing, or can't afford power loss through slippage,

If you don't want noise and wasted power as with gears,

If you DO want your machines to run at exactly the right speed all the time,

If space is an object,

The one good solution is

DIAMOND MACHINERY CHAIN

with which you can run the driven shaft always at a speed proportional to that of the driver, and do it without expense for labor or repairs.

Diamond Chain is light, will go into a much smaller space than belting, and will far outlast the best belt made. Try a Diamond Chain, on one machine.

Write for Book "Chain Transmission of Power."

Diamond Chain & Mfg. Co.
240 W. Georgia St., Indianapolis, Ind.

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Hydraulic Tools.
Niles-Bement-Pond Co., New York.
Watson Stillman Co., New York.

Indicators.
Norton Grinding Co., Worcester, Mass.
Starrett, L. S., Co., Athol, Mass.
Woodman, R., Mfg. & Supply Co., Boston, Mass.

Injectors.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.

Jacks.
Dienelt & Eisenhardt, Philadelphia, Pa.
Watson-Stillman Co., New York.

Jigs.
Sloan & Chace Mfg. Co., Ltd., Newark, N. J.

Key-Seaters.
Baker Bros., Toledo, O.
Burr, John T., & Sons, Brooklyn, N. Y.
Davis, W. P., Mch. Co., Rochester, N. Y.
Mitts & Merrill, Saginaw, Mich.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mch. Co., Rockford, Ill.

Lathes.
American Tool Works Co., Cincinnati, O.
Automatic Mch. Co., Bridgeport, Conn.
Barnes, W. F. & J., Co., Rockford, Ill.
Barnes Drill Co., Rockford, Ill.
Bradford Machine Tool Co., Cincinnati, O.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Mch. Tool Co., Bridgeport, Conn.
Carroll-Jamieson Mch. Tool Co., Batavia, Ohio.
Champion Tool Works Co., Cincinnati, O.
Cincinnati Lathe & Tool Co., Cincinnati, O.
Davis, W. P., Mch. Co., Rochester, N. Y.
Detrick & Harvey Mch. Co., Baltimore, Md.
Elgin Tool Works, Elgin, Ill.
Fay & Scott, Dexter, Me.
Fitchburg Mch. Wks., Fitchburg, Mass.
Flather & Co., Nashua, N. H.
Garvin Mch. Co., New York.
Gisholt Mch. Co., Madison, Wis.
Gould & Eberhardt, Newark, N. J.
Greaves, Klusman & Co., Cincinnati, O.
Hamilton Mch. Tool Co., Hamilton, O.
Hendey Mch. Co., Torrington, Conn.
International Mch. Tool Co., Indianapolis, Ind.
Jones & Lamson Mch. Co., Springfield, Vt.
Le Blond, R. K., Mch. Tool Co., Cincinnati, O.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., New York.
Miami Valley Mch. Tool Co., Dayton, O.
Milwaukee Mch. Tool Co., Milwaukee, Wis.
Morris, J. B., Fdry. Co., Cincinnati, O.
New Haven Mfg. Co., New Haven, Conn.
Niles-Bement-Pond Co., New York.
Potter & Johnston Mch. Co., Pawtucket, R. I.
Pratt & Whitney Co., Hartford, Conn.
Prentice Bros. Co., Worcester, Mass.
Reed, F. E., Co., Worcester, Mass.
Rivett Lathe Mfg. Co., Brighton, Mass.
Robbins Mch. Co., Worcester, Mass.
Rockford Drilling Mch. Co., Rockford, Ill.
Schumacher & Boye, Cincinnati, O.
Sebastian Lathe Co., Cincinnati, O.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Sloan & Chace Mfg. Co., Newark, N. J.
Smurr & Kamen Mch. Co., Chicago, Ill.
Springfield Mch. Tool Co., Springfield, O.
Steinle Turret Mch. Co., Madison, Wis.
Stark Tool Co., Waltham, Mass.
Von Wyck Mch. Tool Co., Cincinnati, O.
Walcott & Wood Mch. Tool Co., Jackson, Mich.
Waltham Mch. Wks., Waltham, Mass.
Warner & Swasey Co., Cleveland, O.
Whitcomb-Blaisdell Mch. Tool Co., Worcester.

Lathe and Planer Tools.
Armstrong Bros. Tool Co., Chicago, Ill.
Le Blond, R. K., Mch. Tool Co., Cincinnati, O.
O. K. Tool Holder Co., Shelton, Conn.
Pratt & Whitney Co., Hartford, Conn.
Western Tool & Mfg. Co., Springfield, O.
Wiley & Russell Mfg. Co., Greenfield, Mass.
Williams, J. H., & Co., Brooklyn, N. Y.

Lifting Magnets.
Brown Engineering Co., Cleveland, O.

Lockers.
Lyon Metallic Mfg. Co., Aurora, Ill.

Lubricants.
Besly, C. H., & Co., Chicago, Ill.
Dixon, Jos., Crucible Co., Jersey City, N. J.

Machine Keys.
Morton Mfg. Co., Muskegon Heights, Mich.
Olney & Warrin, New York.
Standard Gauge Steel Co., Beaver Falls, Pa.

Machine Shop Furniture.
Cleveland Wire Spring Co., Cleveland, O.

Machinery Dealers, Domestic.
McCabe, J. J., New York.
Motch & Merryweather Mchy. Co., Cleveland, O.
Prentiss Tool & Supply Co., New York.
Toomey, Frank, Philadelphia, Pa.
Vandyck Churchill Co., New York.

Machinists' Small Tools.
Besly, C. H., & Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Crescent Mfg. Co., Scottdale, Pa.
Hammacher, Schlemmer & Co., New York.
Pratt & Whitney Co., Hartford, Conn.
Rogers, John M., Works, Gloucester City, N. J.
Sawyer Tool Mfg. Co., Fitchburg, Mass.
Slocomb, J. T., Co., Providence, R. I.
Smith, E. G., Co., Columbia, Pa.
Standard Tool Co., Cleveland, O.
Starrett, L. S., Co., Athol, Mass.
Syracuse Twist Drill Co., Syracuse, N. Y.
Truesdale, S. B., & Co., Rochester, N. Y.
Wells Bros. Co., Greenfield, Mass.
Wyke, J., & Co., Boston, Mass.

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Mandrels.
Cleveland Twist Drill Co., Cleveland, O.
Nicholson, W. H., & Co., Wilkesbarre, Pa.
Pratt & Whitney Co., Hartford, Conn.
Standard Tool Co., Cleveland, O.
Western Tool & Mfg. Co., Springfield, O.

Mechanical Draft.
Sturtevant, B. F., Co., Hyde Park, Mass.

Metal.
Goldschmidt Thermit Co., New York.
Phosphor Bronze Smelting Co., Philadelphia, Pa.

Metal Polish.
Hoffman, George W., Indianapolis, Ind.

Milling Machines.
Adams Co., Dubuque, Ia.
Beaman & Smith Co., Providence, R. I.
Becker Milling Mch. Co., Hyde Park, Mass.
Burke Mchy. Co., Cleveland, O.
Chicago Mch. Tool Co., Chicago, Ill.
Cincinnati Milling Mch. Co., Cincinnati, O.
Dalin Bros., Rockford, Ill.
Fox Mch. Co., Grand Rapids, Mich.
Garvin Mch. Co., New York.
Hendey Mch. Co., Torrington, Conn.
Ingersoll Milling Mch. Co., Rockford, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Knight, W. B., Mchy. Co., St. Louis, Mo.
Le Blond, R. K., Mch. Tool Co., Cincinnati, O.
Newton Mch. Tool Works, Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York.
Owen Mch. Tool Co., Springfield, O.
Pratt & Whitney Co., Hartford, Conn.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Slate, Dwight, Mch. Co., Hartford, Conn.
Sloan & Chace Mfg. Co., Ltd., Newark, N. J.
Waltham Watch Tool Co., Springfield, Mass.
Whitney Mfg. Co., Hartford, Conn.

Milling Cutters.
Becker Milling Mch. Co., Hyde Park, Mass.
Boker, Hermann, & Co., New York and Chicago.
Boston Gear Works, Norfolk Downs, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Garvin Mch. Co., New York.
Morse Twist Drill & Mch. Co., New Bedford.
National Tool Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Conn.
Sloan & Chace Mfg. Co., Ltd., Newark, N. J.
Standard Tool Co., Cleveland, O.
Starrett, L. S., Co., Athol, Mass.

Milling Tools (Hollow Adjustable).
Geometric Tool Co., New Haven, Conn.

Molding Machines.
Obermayer, S., Co., Cincinnati, O.

Motors (Electric).
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Northern Electric Mfg. Co., Madison, Wis.
Robbins & Myers Co., Springfield, O.
Sturtevant, B. F., Co., Hyde Park, Mass.
Western Electric Co., Chicago, Ill.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

Name Plates.
Sackmann, W. L., Akron, O.
Turner Brass Works, Sycamore, Ill.
Waltham Mch. Works, Waltham, Mass.

Nozzles.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Nut Tappers.
Acme Mchy. Co., Cleveland, O.
National Mchy. Co., Tiffin, O.

Oil Cans.
Delphos Mfg. Co., Delphos, O.

Oil Cups.
Bay State Stamping Co., Worcester, Mass.
Besly, C. H., & Co., Chicago, Ill.
Tucker, W. M. & C. F., Hartford, Conn.
Winkley Co., Detroit, Mich.

Oil Hole Covers.
Bay State Stamping Co., Worcester, Mass.
Tucker, W. M. & C. F., Hartford, Conn.
Winkley Co., Detroit, Mich.

Oilless Bearings.
Arguto Oilless Bearing Co., Philadelphia, Pa.

Oil Stones.
Norton Co., Worcester, Mass.

Packing.
New York Belting & Packing Co., New York.

Patterns, Wood and Metal.
Penn Pattern Wks., Chester, Pa.

Pattern Letters.
Butler, A. G., New York.

Patents.
Burnham, Royal E., Washington, D. C.
Howson & Howson, Philadelphia, Pa.
Macdonald & Macdonald, New York.
Parker, C. L., Washington, D. C.
Whittlesey, Geo. P., Washington, D. C.

Pattern Shop Equipment.
Colburn Mch. Tool Co., Franklin, Pa.
Fox Machine Co., Grand Rapids, Mich.

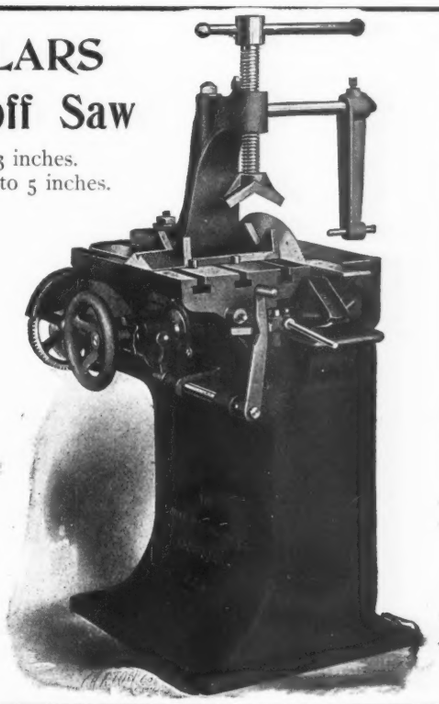
Phosphorizers.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Pipe-Cutting and Threading Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Curtis & Curtis Co., Bridgeport, Conn.
Hart Mfg. Co., Cleveland, O.
Loew Mfg. Co., Cleveland, O.
Merrell Mfg. Co., Toledo, O.

SIXTY DOLLARS
12-in. Cutting-off Saw

Capacity: Rounds, up to 3 inches.
"I" Beams, up to 5 inches.

Friction Power Feed.
Automatic Knockout.
Large Clamping Table.
Up-to-date in every particular.



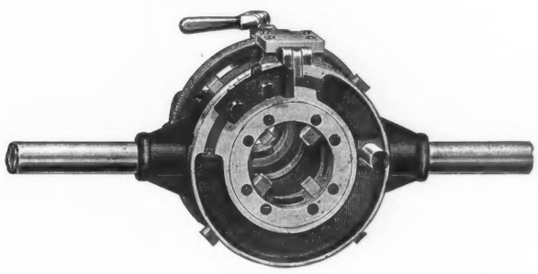
20-INCH SIZE
$125.00
Capacity: 12" "I" Beams

Write us for complete description.

The Burke Machinery Co.
1837 Thirty-fifth St.
CLEVELAND, O.

In threading pipe with a
"BUCKEYE" DIE STOCK

One man does all the work on 2-inch pipe, for instance, with ease.



The operator simply continues the easy turning-around, until he feels the dies release themselves automatically,—that means the thread is finished; there is no turning back to be done then. Several other good points.

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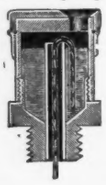
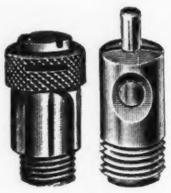
CONTRACT WORK
We use HIGH SPEED STEEL to make our prices right. We finish by grinding to make our work right.
The Blanchard Machine Co Boston Mass

SAVE WORK AND WEAR

Oil Hole Covers and Oil Cups save work for the engineer or machinist, and save wear on delicate machinery by keeping oil channels free from dust. The **Winkley Oil Hole Covers** are the original covers and are made in many styles and sizes to suit all kinds of machinery. Dust proof, self closing, easily cleaned, economical and an ornament to any machine. *Send for booklet, "Oiling Devices."*

Style J Reservoir Oil Cup.





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Do You Know What SHERARDIZING Is?

It signifies a **rust-proof** and attractive finish on iron and steel parts. Ask for samples showing finish. Ask for circular.

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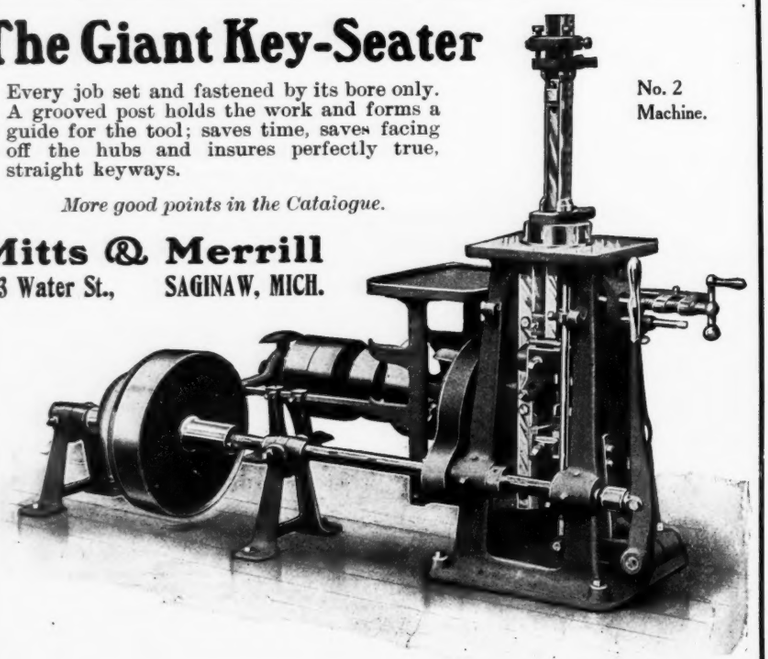
974 Hamilton Avenue, CLEVELAND, OHIO

The Giant Key-Seater

Every job set and fastened by its bore only. A grooved post holds the work and forms a guide for the tool; saves time, saves facing off the hubs and insures perfectly true, straight keyways.

More good points in the Catalogue.

No. 2 Machine.



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ECONOMIZE ECONOMIZE

By throwing away your present Screw Slotter.

BUY A RAPID

MANUFACTURED BY
THE GARVIN MACHINE COMPANY
265 SPRING STREET, NEW YORK

Of what value is your opinion of high-speed steel, if you have not tried

HELLER'S Alloy High-Speed Tool Steel

WRITE FOR CATALOGUE

HELLER BROTHERS CO., Newark, N. J.

Classified Index to Advts. (Continued)

Murchey Mch. & Tool Co., Detroit, Mich.
Pratt & Whitney Co., Hartford, Conn.
Saunders', D., Sons, Yonkers, N. Y.
Standard Engineering Co., Ellwood City, Pa.
Stoever Fdry. & Mfg. Co., Lebanon, Pa.
Trimont Mfg. Co., Roxbury, Mass.

Planers, Metal.
American Tool Wks. Co., Cincinnati, O.
Betts Mch. Co., Wilmington, Del.
Chandler Planer Co., Ayer, Mass.
Cincinnati Planer Co., Cincinnati, O.
Cleveland Crane & Car Co., Wickliffe, O.
Cleveland Planer Wks., Cleveland, O.
Detrick & Harvey Mch. Co., Baltimore, Md.
Flather, Mark, Planer Co., Nashua, N. H.
Gleason Works, Rochester, N. Y.
Gray, G. A., Co., Cincinnati, O.
Hamilton Mch. Tool Co., Hamilton, O.
Morton Mfg. Co., Muskegon Heights, Mich.
New Haven Mfg. Co., New Haven, Conn.
Niles-Bement-Pond Co., New York.
Powell Tool Co., Worcester, Mass.
Pratt & Whitney Co., Hartford, Conn.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Whitcomb-Blaisdell Mch. Tool Co., Worcester.
Wilkinson, A. J., & Co., Boston, Mass.
Wilson, W. A., Mch. Co., Rochester, N. Y.
Woodward & Powell Planer Co., Worcester, Mass.

Plumbago.
Obermayer, S., Co., Cincinnati, O.

Pneumatic Tools.
Bliss, E. W., Co., Brooklyn, N. Y.
Manning, Maxwell & Moore, Inc., New York.
Shepard Elec. Crane & Hoist Co., Montour Falls.

Portable Tools, Repair, Railroad, etc.
Underwood, H. B., & Co.

Potash Kettles.
Gray & Prior Mch. Co., Hartford, Conn.

Presses.
Billings & Spencer Co., Hartford, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Ferracute Mch. Co., Bridgeton, N. J.
Garvin Mch. Co., New York.
Hamilton Mch. Tool Co., Hamilton, O.
Hoefer Mfg. Co., Freeport, Ill.
Miner & Peck Mfg. Co., New Haven, Conn.
Niles-Bement-Pond Co., New York.
Springfield Mch. Tool Co., Springfield, O.
Toledo Mch. & Tool Co., Toledo, O.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
Watson-Stillman Co., New York.
Williams, White & Co., Moline, Ill.

Presses, Power, Forcing.
Lucas Machine Tool Co., Cleveland, O.

Pulley Blocks.
Yale & Towne Mfg. Co., New York.

Pulleys.
American Pulley Co., Philadelphia, Pa.
Poole Eng'rg & Mch. Co., Baltimore, Md.
Saginaw Mfg. Co., Saginaw, Mich.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Wood's, T. B., Sons, Co., Chambersburg, Pa.

Pumps.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
Watson-Stillman Co., New York.

Punches and Dies.
Armstrong-Blum Mfg. Co., Chicago, Ill.
Bliss, E. W., Co., Brooklyn, N. Y.
Burke Mchy. Co., Cleveland, O.
Cleveland Crane & Car Co., Wickliffe, O.
Globe Mch. & Stamping Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Conn.
Richards, I. P., Providence, R. I.
Sloan & Chace Mfg. Co., Ltd., Newark, N. J.
Watson-Stillman Co., New York.
Whitman & Barnes Mfg. Co., Chicago, Ill.

Punching and Shearing Machinery.
Bertsch & Co., Cambridge City, Ind.
Bliss, E. W., Co., Brooklyn, N. Y.
Cincinnati Punch & Shear Co., Cincinnati, O.
Cleveland Crane & Car Co., Wickliffe, O.
Krips-Mason Mch. Co., Philadelphia, Pa.
Long & Allstatter Co., Hamilton, O.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Hartford, Conn.
Royersford Foundry & Mch. Co., Royersford, Pa.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Toledo Mch. & Tool Co., Toledo, O.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
Watson-Stillman Co., New York.
Williams, White & Co., Moline, Ill.

Rapping Plates.
Milwaukee Fdry. Supply Co., Milwaukee, Wis.

Reamers.
Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Rogers, John M., Works, Gloucester City, N. J.
Standard Tool Co., Cleveland, O.
Van Dorn Elec. & Mfg. Co., Cleveland, O.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Reamers, Adjustable.
Cleveland Twist Drill Co., Cleveland, O.
Crescent Mfg. Co., Scottdale, Pa.
Kelly Tool Co., Cleveland, O.
Lapointe Machine Tool Co., Hudson, Mass.
Pratt & Whitney Co., Hartford, Conn.
Rogers, John M., Works, Gloucester City, N. J.
Schellenbach-Hunt Tool Co., Cincinnati, O.

Reamers, Pneumatic.
Stow Flexible Shaft Co., Philadelphia, Pa.

Rivet and Spike Machinery.
National Mchy. Co., Tiffin, O.

Riveters.
Chambersburg Engineering Co., Chambersburg, Pa.
Grant Mfg. & Mch. Co., Bridgeport, Conn.
Niles-Bement-Pond Co., New York.
Sellers, Wm., & Co., Inc., Philadelphia, Pa.
Shepard Elec. Crane & Hoist Co., Montour Falls.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.

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Roller Bearings.
Bantam Anti-Friction Co., Bantam, Conn.

Saw Blades.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Millers Falls Co., New York.

Saw Tables.
Crescent Mch. Co., Leetonia, O.

Saws, Power and Hand.
Diamond Saw & Stamping Wks,, Buffalo, N. Y.
Espen-Lucas Mch. Wks., Philadelphia, Pa.
Millers Falls Co., New York.
Racine Gas Engine Co., Racine, Wis.
Story, H. T., Chicago, Ill.
Tabor Mfg. Co., Philadelphia, Pa.

Saws, Band.
Crescent Mch. Co., Leetonia, O.
Fox Mch. Co., Grand Rapids, Mich.

Schools.
International Corr. Schools, Scranton, Pa.

Screw Machinery.
Cook, Asa S., Co., Hartford, Conn.

Screw Machines.
Cleveland Auto. Mch. Co., Cleveland, O.
Garvin Mch. Co., New York.
National-Acme Mfg. Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Conn.
Smurr & Kamen Mch. Co., Chicago, Ill.
Universal Mch. Screw Co., Hartford, Conn.
Warner & Swasey Co., Cleveland, O.

Separators, Oil.
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New Haven Mfg. Co., New Haven, Conn.
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Pratt & Whitney Co., Hartford, Conn.
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Stockbridge Mch. Co., Worcester, Mass.
Walcott & Wood Mch. Tool Co., Jackson, Mich.

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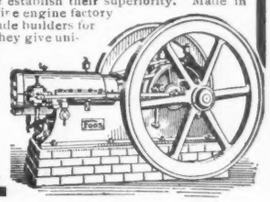

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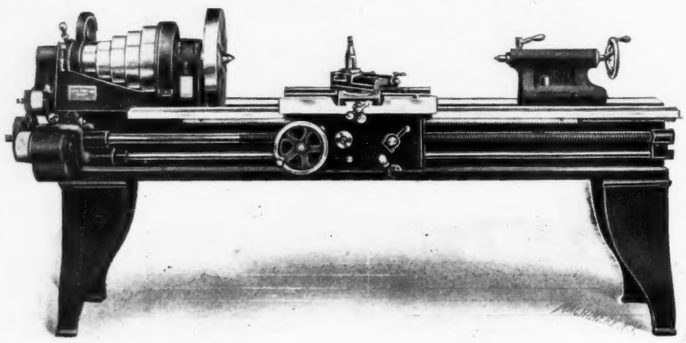

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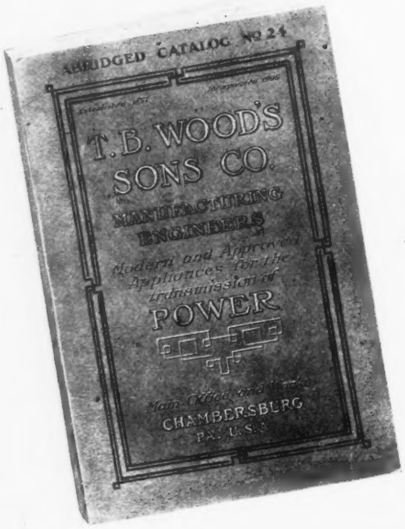

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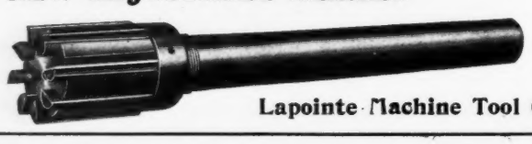

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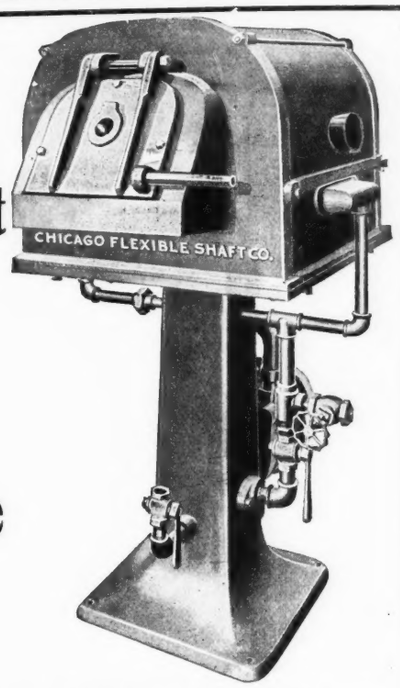

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YOUR PATTERNMAKERS

with the block plane and cut-and-try method of fitting together pattern parts.

THEIR TIME IT TOO EXPENSIVE

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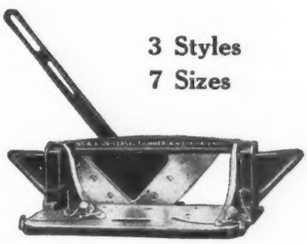

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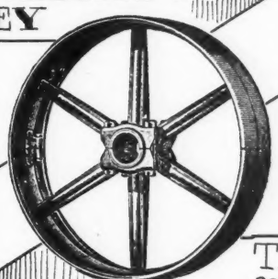

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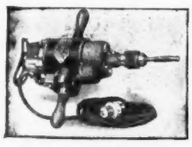

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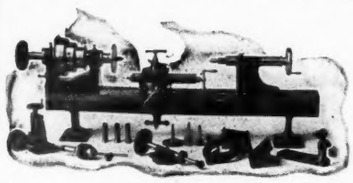

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WELDLESS EYE NUTS?

They are drop forged of steel without a weld or artificial joint of any kind. Six sizes, from ⅞ of an inch to 2 inches inclusive. Blanks or U. S. S. Write for circular.

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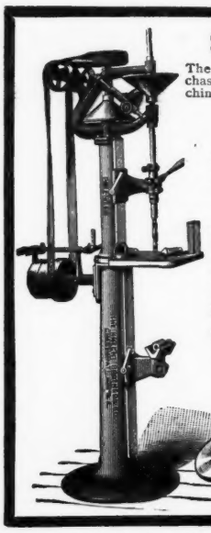

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give satisfaction from the moment they begin their work.

Because They Are
unsurpassed in material and workmanship. Compact and rigid in design. Accurate and convenient in operation. With such a machine properly used, you cannot help saving money. Booklet yours for the asking.

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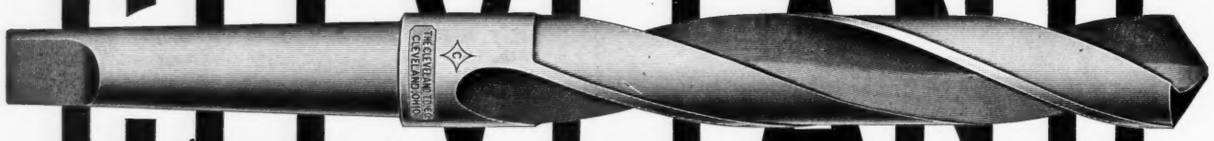

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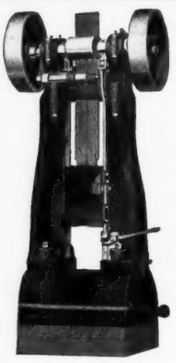

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The Uniformity of Work Produced by the Grant Riveting Machine

is an advantage that would alone be sufficient to put the Grant machine in the lead; but beyond this the work is superior to other methods of riveting, can be done in a fraction of the time, and the process is absolutely noiseless. No blow is struck, plates are not cracked or bruised, and a smooth, perfect head can be swedged on any rivet in one second.

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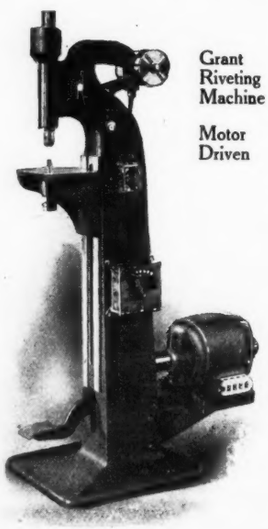

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Motor Driven

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ENGINEERS AND MACHINISTS

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Correspondence solicited.

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In strength, in detail, in quantity and quality of information it far surpasses our former No. 180 Tool Catalogue, which was always so favorably received by tool buyers.

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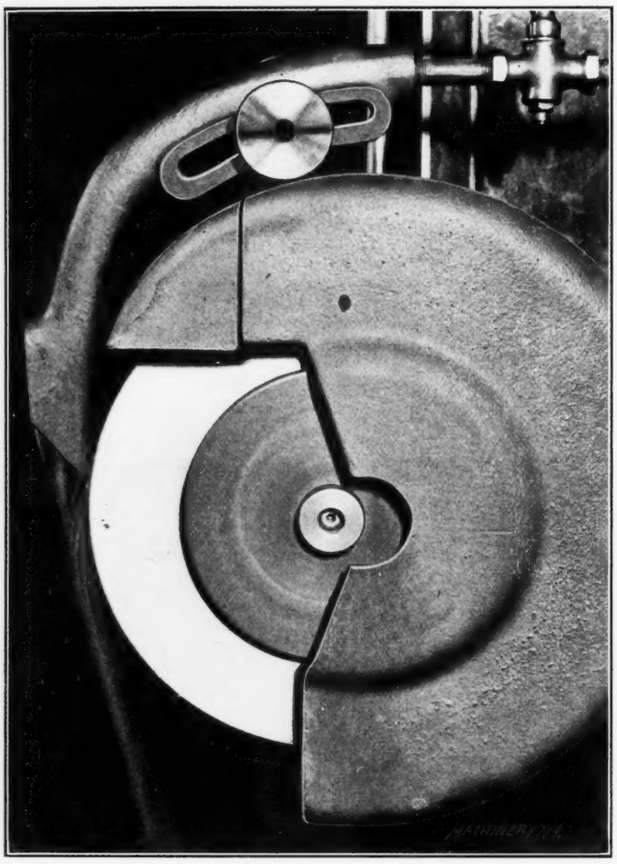

No Spray

No Slop

No Trouble

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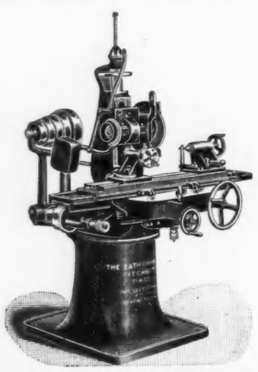
It throws a stream of water onto the wheel and directs it against the grinding surface exactly where needed. The volume of water can be controlled from the maximum capacity of the spout down to a mere drizzle—always without spatter, and always where its wanted.

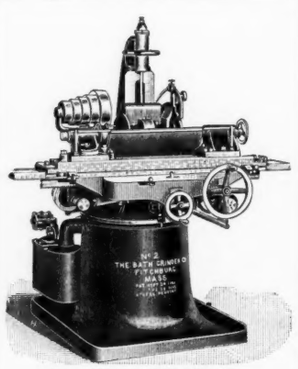


Front View No. 1 Machine

This is just one of the Bath Grinders' good points—the list is a long one. May we send catalogue describing the machine?

BATH GRINDER COMPANY

FITCHBURG, MASS., U. S. A.



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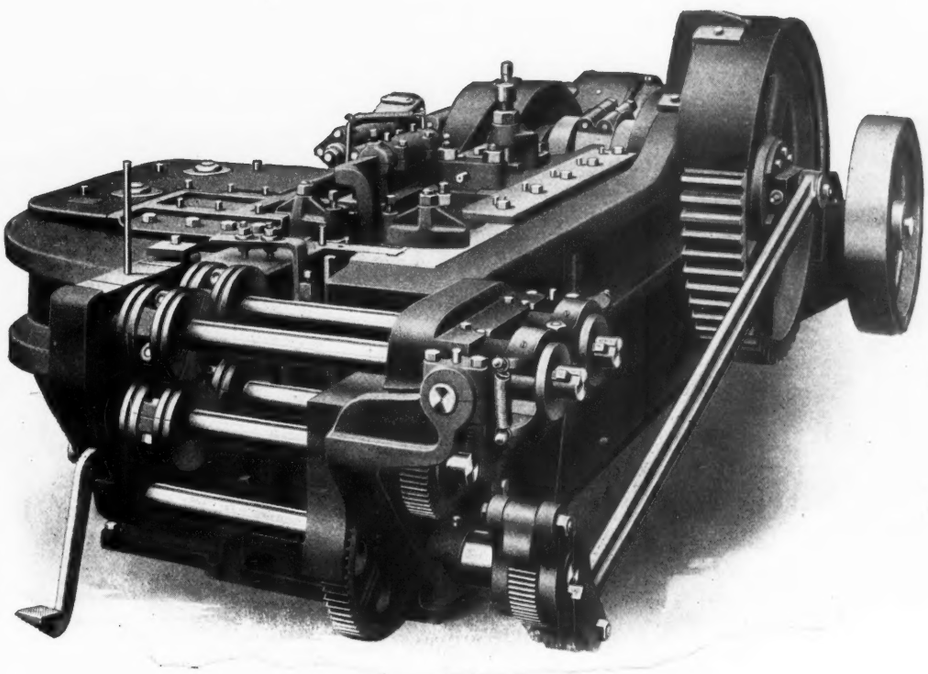
Nearly Double the Production of Hand Machines can be Secured with the

AJAX AUTOMATIC FEED RIVET MACHINE



Automatic Feed Rivet Heading Machine—Motor Driven.

For the production of rivets in large quantities the economy of this machine is unequaled. It is the highest type of its class and built from new designs. Rivet Bars in mill lengths, are heated in long furnaces and are then fed into the machine which makes the entire length of bar into rivets, one at each revolution, without any further handling. Another feature is the elimination of loss from stub ends. Made in two sizes, belt or motor drive, as desired.

Send for Circulars.

The Ajax Manufacturing Company

CLEVELAND, OHIO

New York: Fulton Terminal Bldg., 50 Church St. **Chicago: 621 Marquette Building.**

de Fries & Co., Dusseldorf, Germany
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Little Giant.

TAPS SCREW PLATES

BOLT CUTTERS DIES

THE BETTER THE TOOLS
THE BETTER THE PRODUCT

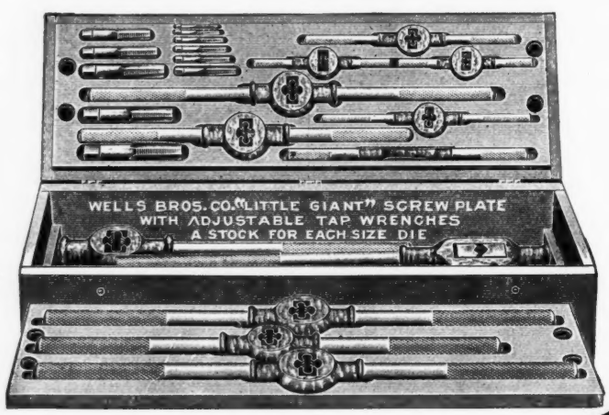
Do your Screw Cutting Work with

Little Giant.

SCREW CUTTING TOOLS

You can't buy better tools than those bearing this stamp, and you can't do better work than they will produce.

They have strength, temper, accuracy, they are fast workers, are long lived and are adapted for every class of work.



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WELLS BROS. COMPANY
GREENFIELD, MASSACHUSETTS

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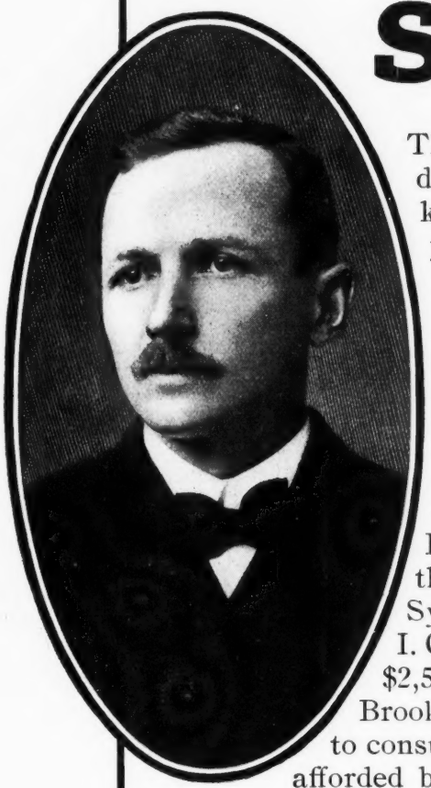
Possibilities of Salary Raising



F. L. RAY

The possibilities of **your** securing a raise in salary depend 90% on one thing—upon your securing the knowledge and **training** that will really qualify you to hold a higher position commanding a larger salary. Such training has helped thousands of men in the same way that it helped Frederick L. Ray to advance from work as a machinery erector to power superintendent for the Stanley Rule & Level Company, of New Britain, Conn., and later to superintendent of construction for W. M. Sheehan & Co., New York City. Mr. Ray's earnings have, of course, increased very largely since he became an I. C. S. trained man—for it was through the I. C. S. that he secured his training. Robert H. Fisher, 316 Syndicate Bldg., St. Paul, Minn., took advantage of I. C. S. training, and thereby increased his earnings $2,500 a year. Joseph V. Woodworth, Arbuckle Bldg., Brooklyn, N. Y., advanced from a position as shop hand to consulting mechanical expert through the training afforded by his I. C. S. Course.

It is **training** that counts. You **must** bring training into your work today if you wish to secure anything above a subordinate position with low wages.

The quickest, surest, and most practical way in the world to secure this training is by the plan of the International Correspondence Schools, an institution backed by a capital of six million dollars and with nearly 17 years' experience in the sole business of providing ambitious men with salary-raising training. You do not have to leave home or your present work. Full details of how this plan can be adapted to your personal needs and circumstances, no matter how scant your time, money, or education, will be sent free to any one marking and mailing this coupon. This puts you under no obligation.

If you really want a better position, use this coupon NOW.

International Correspondence Schools
Box 980, SCRANTON, PA.

Please explain, without further obligation on my part, how I can qualify for a larger salary in the position before which I have marked X.

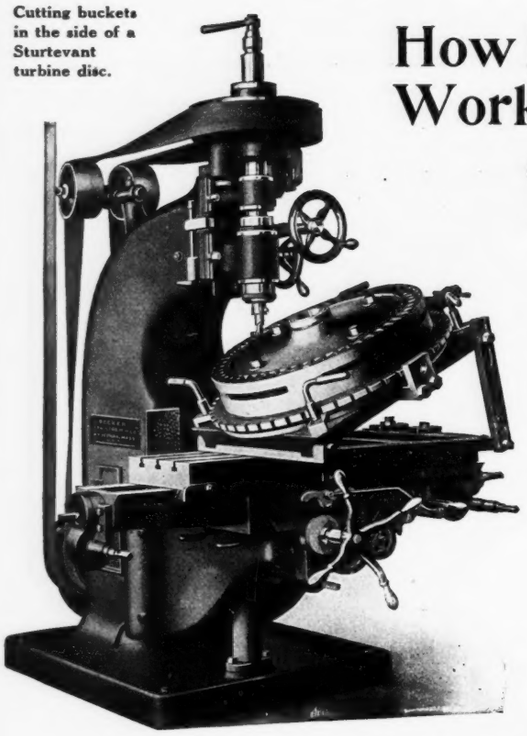
Electrical Engineer	Civil Engineer	Chemist
Electrical Mach. Des.	Stationary Engineer	Assayer
Dynamo Foreman	Gas Engineer	Illustrator
Electric-Light Supt.	Refrigeration Engineer	Bookkeeper
Electric-Railway Supt.	Foreman Machinist	Stenographer
Electrician	Foreman Toolmaker	Civil Service Exams.
Telephone Engineer	Foreman Molder	Commercial Law
Telegraph Engineer	Foreman Blacksmith	Architect
Mechanical Engineer	Sheet-Metal Draftsman	Structural Engineer
Machine Designer	Marine Engineer	Contractor and Builder
Mechanical Draftsman	Hydraulic Engineer	Ad Writer
Foreman Patternmaker	Mining Engineer	Window Trimmer

Name_____

Street and No._____

City_____ State_____

Cutting buckets in the side of a Sturtevant turbine disc.



How Else Could You Do This Work?

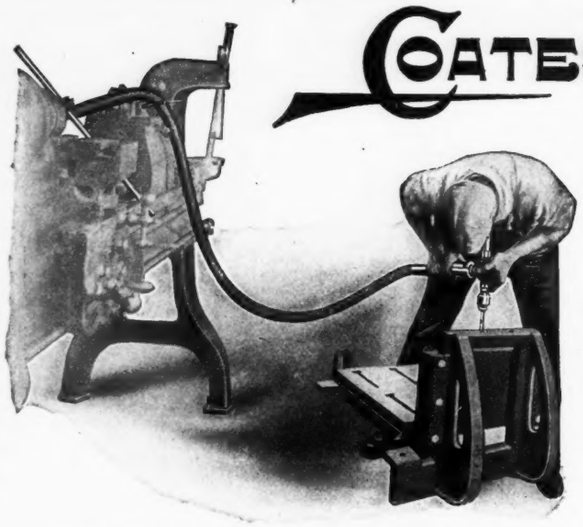
THE VERTICAL MILLER

is the most adaptable tool to be found in the modern machine shop; it will do a larger variety of work, do it better and do it quicker than any other single machine. The new horizontal attachment adds to the **Becker-Brainard Vertical Miller** the essential features of the horizontal type, including the cutting of spirals. The permanency of alignment of the vertical spindle, the staunch design, the great depth of throat, the convenience of operation, all combine to make it an indispensable tool.

The Becker Milling Machine Co.

Hyde Park, Mass., U. S. A.

AGENTS:—McDowell, Stocker & Co., Chicago. L. H. Swind, Philadelphia, Pa. A. F. Kummel Hartford, Conn. Chas. G. Smith Co., Pittsburg, Pa. J. L. Osgood. Buffalo, N. Y. A. B. Bowman, St. Louis, Mo. A. R. Williams Machinery Co., Toronto, Ont. and Montreal, Winnipeg and Vancouver, Canada. Ludw. Loewe & Co., Berlin, Germany. Bevan & Edwards Propty. Ltd., Melbourne, Australia. Selig, Sonnenthal & Co., London, England. Schuchardt & Schutte, Berlin, Germany; Vienna, Austria; Stockholm, Sweden; St. Petersburg, Russia; Copenhagen, Denmark; Budapest, Hungary; Shanghai, China. A. H. Schutte, Cologne, Germany; Liege, Belgium; Milan, Italy; Barcelona, Spain; Brussels, Belgium; Paris, France; Bilbao, Spain.



Coates Flexible Shaft used in connection with breast drill.

COATES UNIT LINK FLEXIBLE SHAFT

For Drilling, Grinding, Polishing—for a hundred and one purposes of every day work—there is no device that equals the Coates Flexible Shaft. It will save an immense amount of time and labor; can be used anywhere and at any angle; the drive is steady throughout the entire length, running either backward or forward. It is perfectly flexible—bend it as much as you like; each link is a unit made of hardened steel and driven by by a square spheroid – the strongest drive possible. If a link breaks it is only a matter of a few minutes time and a few cents expense to replace it.

Convenient, durable and efficient—a Coates outfit should be in every shop.

Ask for Bulletin No. 21—the latest.

Section of the Unit Link Shaft.

COATES CLIPPER MFG. CO., Worcester, Mass.

This picture is shown for the purpose of emphasizing the fact that the

Thompson Universal Grinding Machine

is built with a perfect **water attachment.** Long open tank on base, easy to keep clean. Top of knee cast solid in the form of a basin, into which all water drains from above, and from which it is conducted through pipes to the tank.

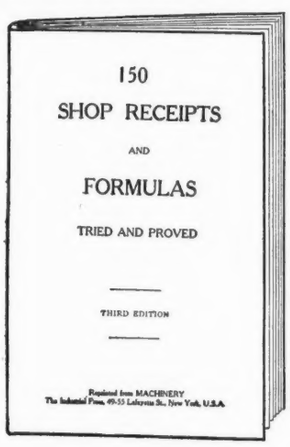
This grinding machine is **convertable** into a **plain** grinder; a **surface** grinder; a **knife** grinder; a **die** grinder; a **cutter** grinder, or an **internal** grinder, and in each form it works to perfection.

Circulars and prices upon request.

The Thompson Grinder Co.
SPRINGFIELD, OHIO
Selig, Sonnenthal & Co., London Agents.

150 Shop Receipts and Formulas

MACHINERY'S 132 Page Booklet



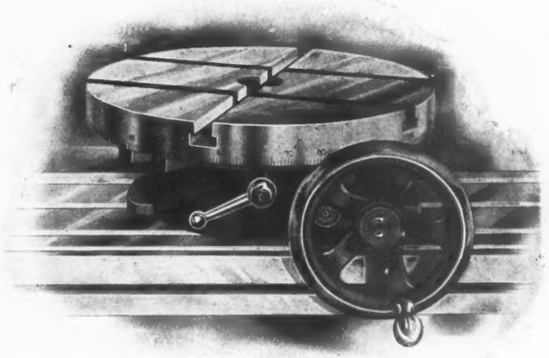
A collection of valuable Receipts and Formulas arranged for ready reference. The receipts in this Booklet are completely indexed and printed on one side of the paper only.

This Booklet and MACHINERY, Shop Edition, for one year, for $1.00; or with Engineering Edition, six months, for $1.00.

THE INDUSTRIAL PRESS
49-55 Lafayette Street, New York

We Build Machinery for Others

Don't you want some also?
Our **Shop Equipment,** with which we build our **Milling Machines** is more than we can use. Just thought you might want to make use of it.
We make **Milling Cutters** and we do **Gear Cutting** as well.
Our Planers, Lathes, Shapers and Millers are all ready for your order, send it along.
We won't overcharge you, and we promise good work.
Now are you ready to talk it over?



Owen Circular Milling Attachment

For use on milling machines and of especial advantage in connection with the vertical attachment. Table is 15″ in diameter, with three T-slots, hand feed and entire circumference of circle graduated to degrees. Also made with automatic feed for both Plain and Universal Machines.

The Owen Machine Tool Company

Dept. M., SPRINGFIELD, OHIO

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TAKE IT OUT!—when through—or it will **fall** out. { **No Heat. No Bind. No Warp.** } **HIGH SPEED. Tempered RIGHT**

Our Story is Short and will interest you in "DOLLARS" WAYS.

THE KELLY REAMER

Will Bore or Ream { **Absolutely Accurate, Parallel and SMOOTH** **ANYTHING** From a one inch hole to a **60" ENGINE CYLINDER**

and your piston rings will **LAST.**

THE MECHANICALLY CORRECT— CONVEX—RADIAL—CLEARANCE—DOES IT.

It **BORES** or **REAMS any** hole in **any** material on **any Turret Machine, AND** with **taper shank** on boring bar—on **any lathe, boring mill** or **drill press. Two broad blades, radially** "cleared," beat the "multiplicity" kind—**don't need "back gears" SPEED UP** on **"open belt"**—then let things **move. Business is improving,** you'll **GET BUSY** very soon and can't try **"good things."** Order a sample **KELLY** Reamer **RIGHT NOW** and **prove out** a **modern method.**

"FLOAT" in smooth material—use "RIGID" in porous work.

This set, in case, for your Tool Room List $73.10 Less 5% on **Full Set** order.

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FLOATING
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No. 7 " 2½" to 2¾" - - " 4.10
No. 8 " 2¾" to 3" - - " 4.20
No. 9 " 3" to 3¼" - - " 4.30
No. 10 " 3¼" to 3½" - - " 4.40
No. 11 " 3½" to 3¾" - - " 4.50
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No. 13 " 4" to 4¼" - - " 4.70
No. 14 " 4¼" to 4½" - - " 4.80
No. 15 " 4½" to 4¾" - - " 4.90
No. 16 " 4¾" to 5" - - " 5.00
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SUBJECT TO A 5% DISCOUNT FOR COMPLETE SET OF 17 REAMERS. OTHERWISE LIST IS POSITIVELY NET.
ONE KELLY REAMER IS SIZE EQUIVALENT TO 2500 SHELL REAMERS REAMING IN TEN-THOUSANDTHS. IN ORDERING GIVE NUMBER
5 4¾ 4½ 4¼ 4 3¾ 3½ 3¼ 3 2¾ 2½ 2¼ 2 1¾ 1½ 1¼ 1
THE KELLY TOOL CO.
CLEVELAND U.S.A.

PROOF

Our goods are **returnable at our expense,** if after an honest test, they fail to **"back up" our claims.**

☞**This** is our **net** list. It's up to **you.** A full set? or — How many?

We will bill this set $400,000. below the cost of any other make — giving you the same **CAPACITY**—viz: — 42,500 diameters varying by **ten thousandths,** 1" to 5¼".

PRICES QUOTED

On heavy bar reamers—5" to 60" diameter.

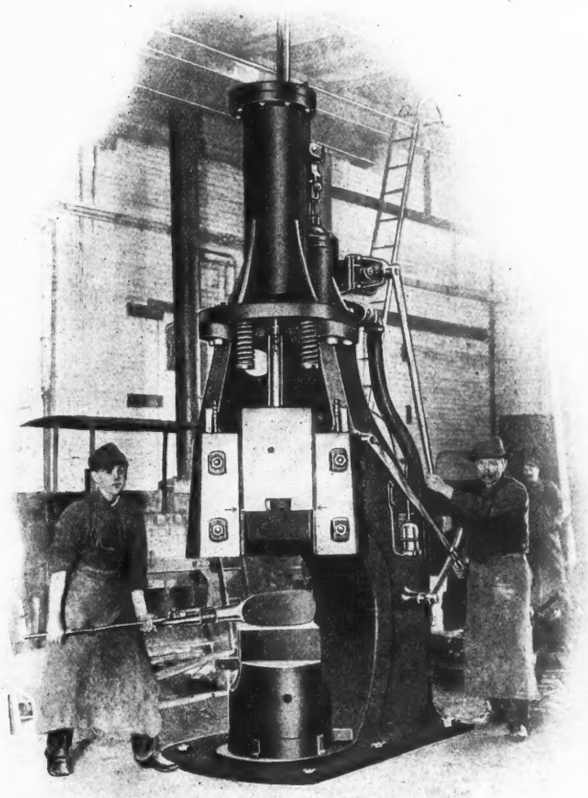
Ask us, if you **mean business.**

We are too busy to "visit"—**much.**

SAME PRICE—Order direct—or through your jobber—We play no favorites.

THE PRENTISS LINE OF 20th CENTURY MACHINE TOOLS

For the efficient and economical handling of high speed steels.
See our stock of machines before you place your fall orders.



THE FAMOUS BELL STEAM HAMMERS

are built as a specialty and combine the best in design, material and workmanship. The main frame is an open hearth steel casting, one piece with the anvil block, and carefully proportioned to resist the shock of hammer blows and shearing strains. They are operated by steam or compressed air, are double acting, taking steam at the top and bottom of stroke, and are under perfect control of the operator. The valve motion is very simple, with few working parts and is of the most durable type. These hammers can be used for light drop forge work as well as work requiring the adaptability of the Standard Pattern Guide Hammer. Upper and lower dies maintain perfect alignment under all conditions so the machine can be used with formed dies. Strong and rigid and efficient. Write us about them.

PRENTISS TOOL AND SUPPLY CO.

115 LIBERTY ST., NEW YORK.

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Quick, Easy Hoisting

results from the use of efficient chain blocks, those which cut out wasteful friction and return in foot pounds of lifting, the greatest percentage of the operator's pull on the hand chain.

Triplex Blocks

have, separated from the hoisting gear, a positive brake which develops friction only in lowering. The balanced gearing has accurately machined wearing surfaces and the chain links fit the sheave pockets with scientific accuracy.

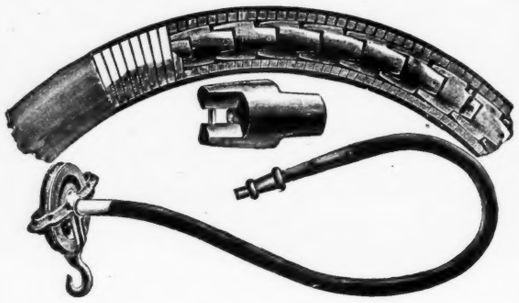
This results in a smooth, steady running hoist, which lives up to its efficiency for a long period of usefulness.

Write for Catalog.

THE YALE & TOWNE MFG. CO.

9 Murray St., New York City

The Gem Flexible Shaft



The Test of Years of Service

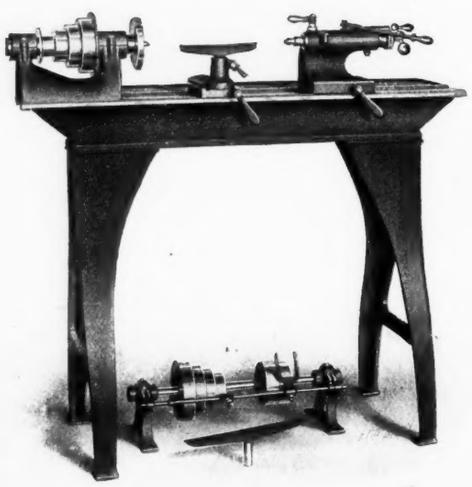
is back of the Gem Flexible Shaft. Its economy and efficiency have been proved under severest conditions, and its adaptability to a great variety of purposes gives it an added advantage. It is the strongest and easiest running shaft made; meets requirements not possible with other shafts; can be used in greater lengths; delivers the maximum power running in either direction; has all parts interchangeable and in case of accident repairs can be quickly effected.

More advantages and some applications set forth in Bulletin No 4—may we send it?

GEM MANUFACTURING COMPANY

3253 Spruce Street, Pittsburg, Pa.

"SENECA FALLS" 10-INCH SPEED LATHE



Another of the notable "Seneca Falls" tools, carefully designed, well built with strong, rigid bed thoroughly braced with cross webs. Self-oiling, dust-proof bearings, tailstock with combination screw and lever feeds, are features of this machine; locking levers are attached and always in place; countershaft has self-oiling and self-aligning bearings. Draw in chuck and split collet furnished when desired. 10" and 12" sizes. Ask for Catalogue B.

The Seneca Falls Mfg. Company

330 Water Street, Seneca Falls, N. Y. 144

THE ALL STEEL WRENCH

Coes Genuine "Steel Handle" Model

30 per cent. stronger, size for size, than any other wrench made. Outwears any other 3 to 1; stands fire, water, heat, cold, acids, mud—made for heavy railroad work and proved under every condition of service.

If you are looking for the strongest, handiest, the *best* wrench for rough practice ask for Coes "Steel Handle" Wrench. *Ask for it, and see that you get it*—the Coes trade mark is stamped on every tool—and if a smart salesman puts up the old argument—"something just as good", call his bluff—

MAKE HIM PROVE IT.

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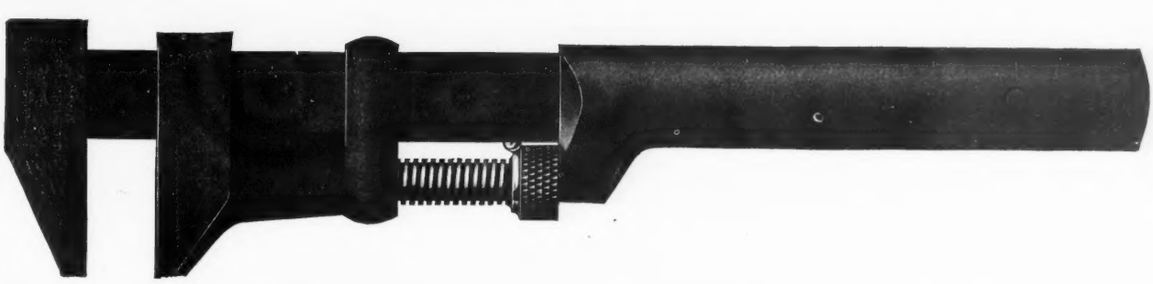
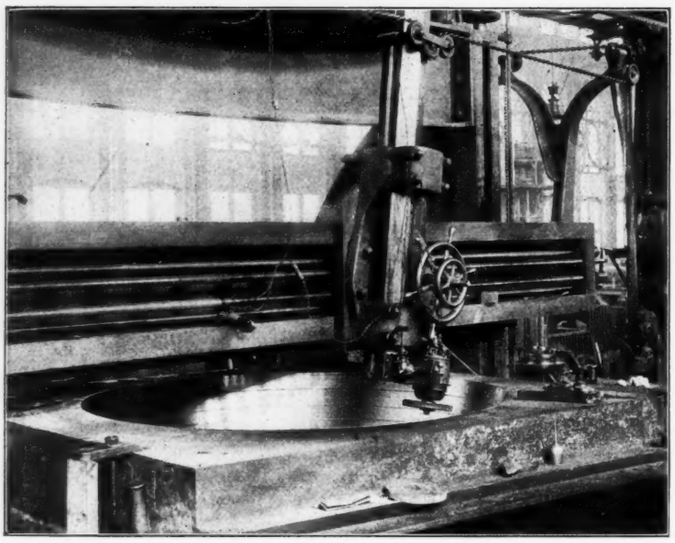
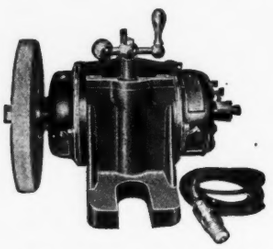


AN ELECTRIC GRIND



One of the many ways the "U. S." Grinders are used. This is a 2 H. P. Grinder. A felt wheel was used to put on a smooth finish. Grinders can be used on a lathe or planer.

"U. S." tools have a special electrical feature whereas they will *not run hot* nor *spark under load.* Electric Drills made to drill up to 1¼" in steel—all motors are air cooled. Best by Test. **Sent on Trial.**



Made in 3 Sizes

½ H. P. Wheel, . . .	8" x ¾"
1 H. P. Wheel, . . .	10" x 1 "
2 H. P. Wheel, . . .	12" x 1¼"

Write for our new Catalogue illustrating some of the many uses. Direct or alternating current.

THE UNITED STATES ELECTRICAL TOOL CO., Cincinnati, O., U. S. A.

New York Office, 90 West Street.

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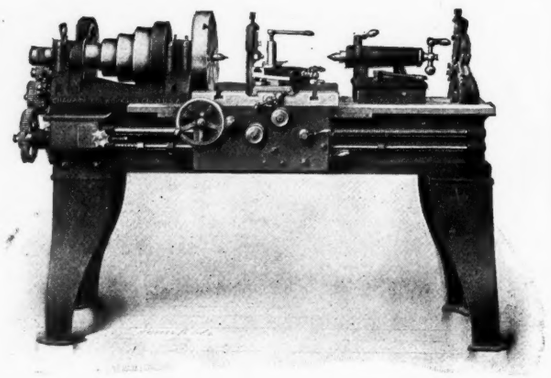
A 16 in. x 6 ft. Bed
CHAMPION LATHE
Weighs 2110 lbs. Net

And weight counts if it is distributed like it is in our lathes. 4 Step Cone for 3 inch Belt, large Spindle Bearings, big hole in Spindle, heavy gearing, and long Carriage with Wide Bridge.

5 Sizes: 10-12-14-16 and 18 in. Swing.



Champion Tool Works Co.,
2422 Spring Grove Ave., Cincinnati, Ohio, U. S. A.

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Steam Engineering, Heating, Ventilating, Power Plants, Boilers, Piping, Engines, Turbines, Condensers, Heaters; including Theory, Practice, Design and Operation; both Elementary and Advanced.

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Under this offer we send you the complete set of Shop Operation Sheets published to date, 72 in all, and MACHINERY, Engineering Edition, for one year, for two dollars. *Three dollars (12s. 6d.) in foreign countries.* These Shop Operation Sheets are laid out on strong manila paper in notebook form. They are original with MACHINERY, are copyrighted and cannot be obtained elsewhere. Write

THE INDUSTRIAL PRESS
49-55 Lafayette Street, New York City

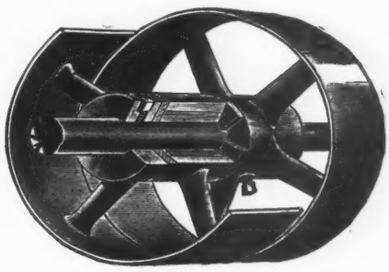
"Arguto" It is only a Question of Time

TRADE MARK

And a short time at that, before every loose pulley and friction clutch in *your* plant and in your neighbor's plant will be equipped with

HIGHEST AWARD
JAMESTOWN EXPOSITION
1907

ARGUTO OILLESS BEARINGS



Loose Pulley Equipment.

They are the bearings of the day and of the future. They solve the vexed question of lubricating rapid running loose pulleys; save labor, reduce fire risk, promote cleanliness and prolong the life of your belts.

They are adapted for all light, high speed machinery and were awarded the Gold Medal at the Jamestown Exposition because of their manifold advantages and their superiority over every other device of the kind.

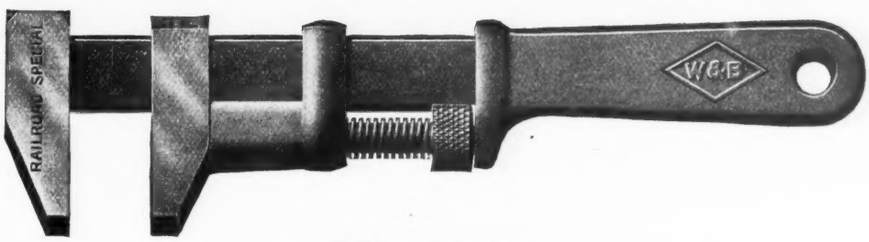
A trial is all we ask—the bearing will do the rest.

ARGUTO OILLESS BEARING CO.

WAYNE JUNCTION, PHILADELPHIA, PA.

The "RAILROAD SPECIAL"

The Strongest Wrench Made, Barring None



BECAUSE:

The Head and Bar are Drop Forged **in one piece from open hearth steel.**
The Screw and Jaw have a deeply milled thread.
The Handle is our "W & B" Indestructible Iron Handle, and it fits the hand.
The Jaws are case hardened, the entire Wrench ground and polished and highly finished.
It is the most economical Wrench on the market and is used by the largest Railroads and Manufacturers in the world because it saves them money.

The Whitman & Barnes Manufacturing Co.

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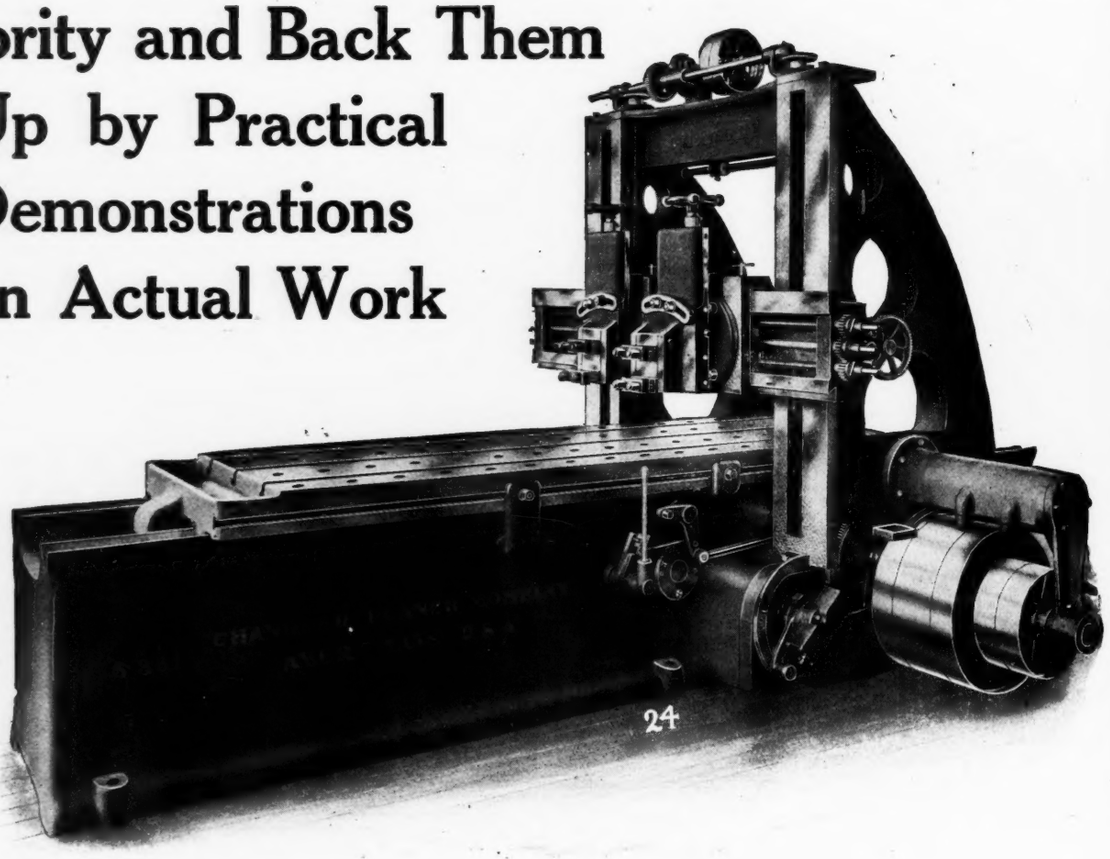
We Make Unqualified Claims of Superiority and Back Them Up by Practical Demonstrations on Actual Work



Why and Wherein Chandler Planers Surpass:

1. They cut more linear feet per minute by running faster in each direction and reversing more promptly at each end.
2. They remove more metal per each foot of run.
3. They secure an accurate surface in less chips.
4. They do the same amount of work in fewer strokes, thus economizing power. Reversing and returning represent wasted energy.
5. They deliver at the tool point a larger per cent. of the belt power.
6. By massive construction and accurate gear train, chattering is reduced to a minimum and an increased efficiency is secured with high speed steel.
7. Every adjustment is instantly made without the necessity of stopping the planer. This not only saves time but insures the best operating conditions on all classes of work.
8. They can be operated more hours per year. No planer requires so few repairs and has so few breakdowns.

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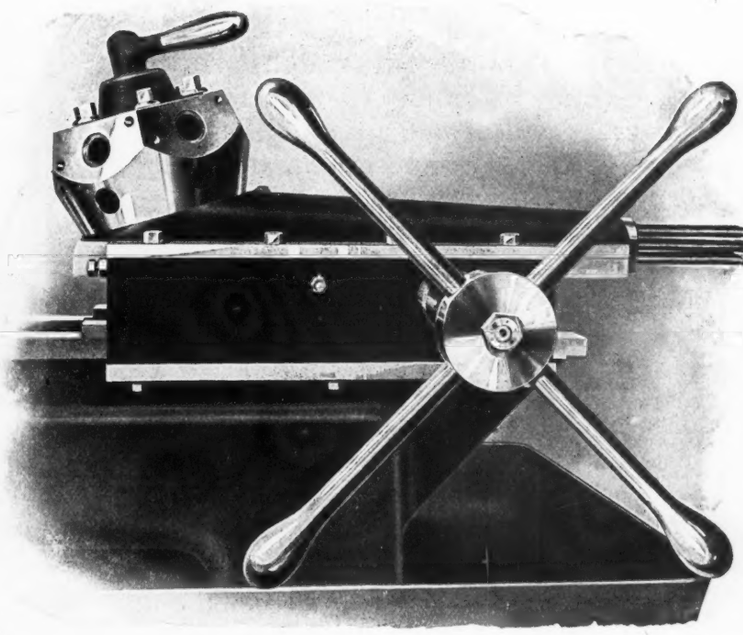

Perfect automatic indexing and automatic stops.

Takes stock directly through the turret.

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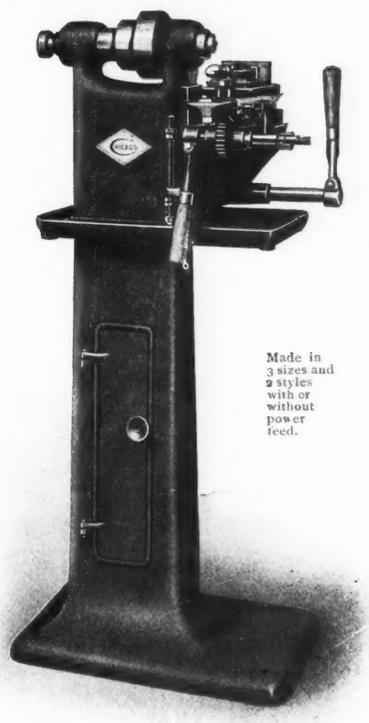

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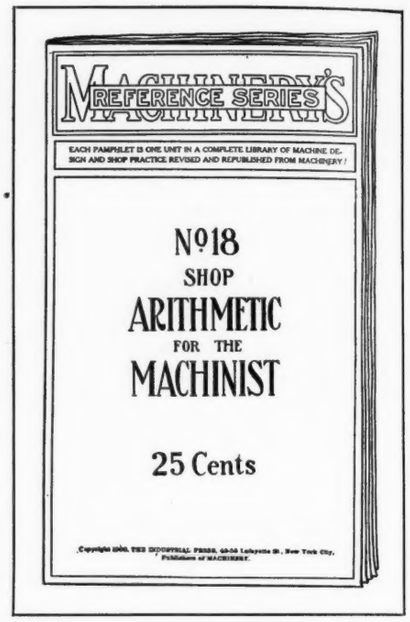

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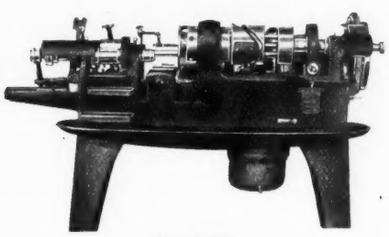
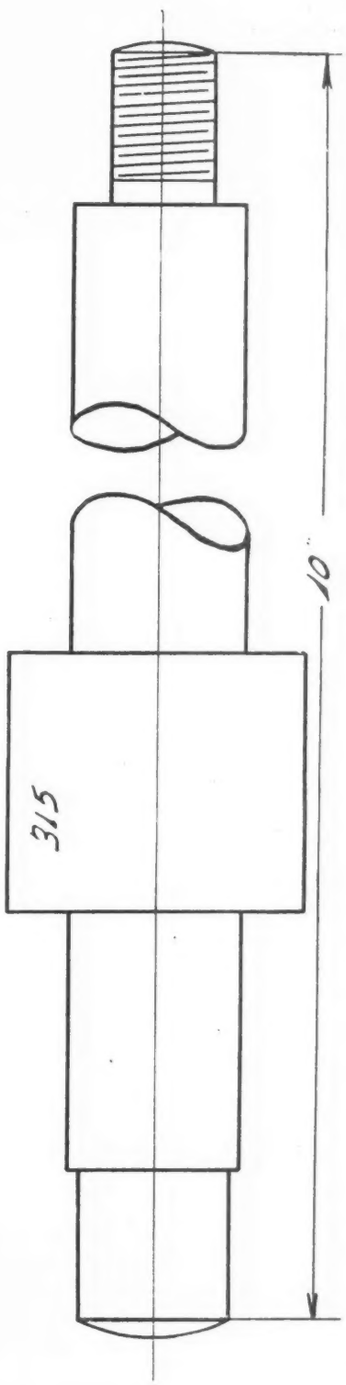


TURRET

OPERATING EXPENSE ONE MILL A MINUTE



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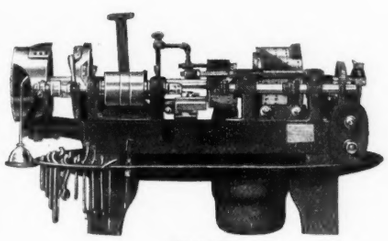

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The Pre-eminence of the "Cleveland" is Indisputable

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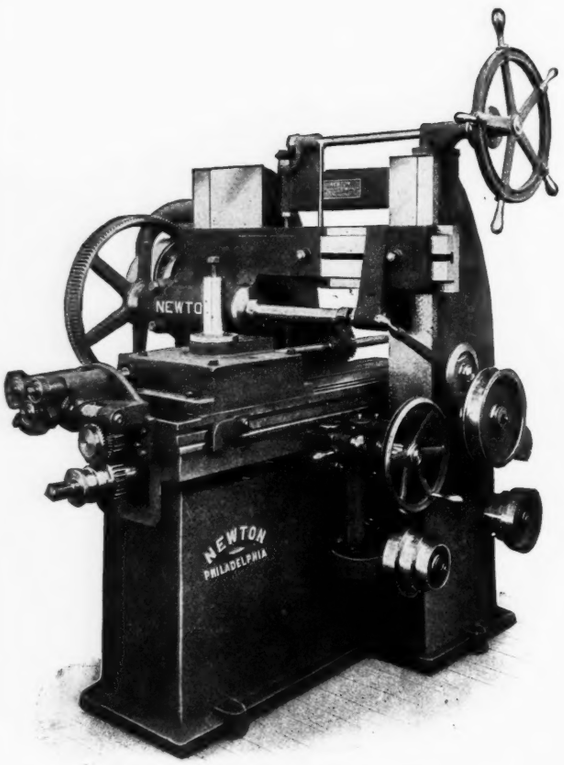

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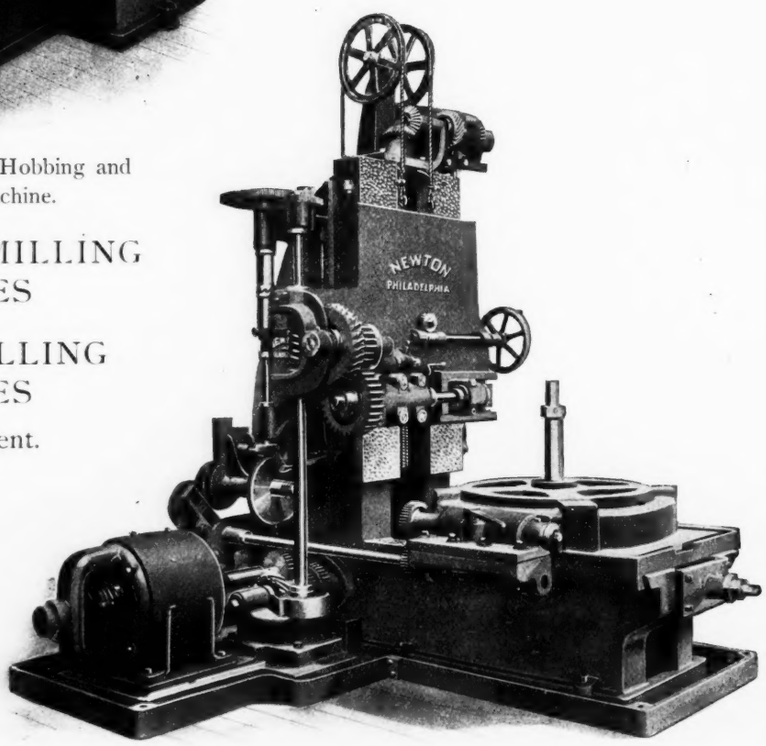

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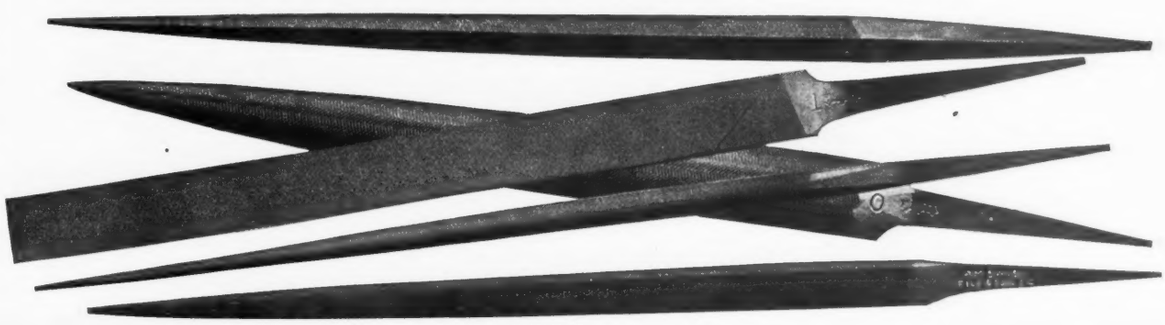

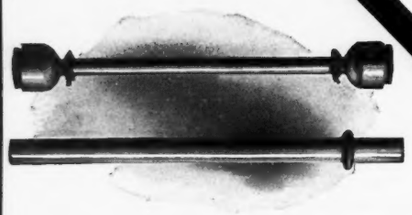

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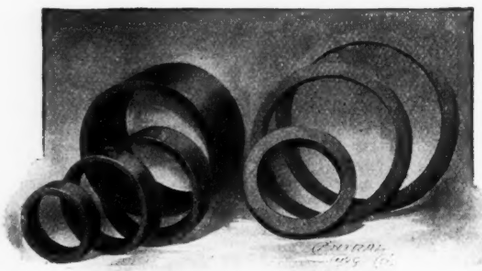

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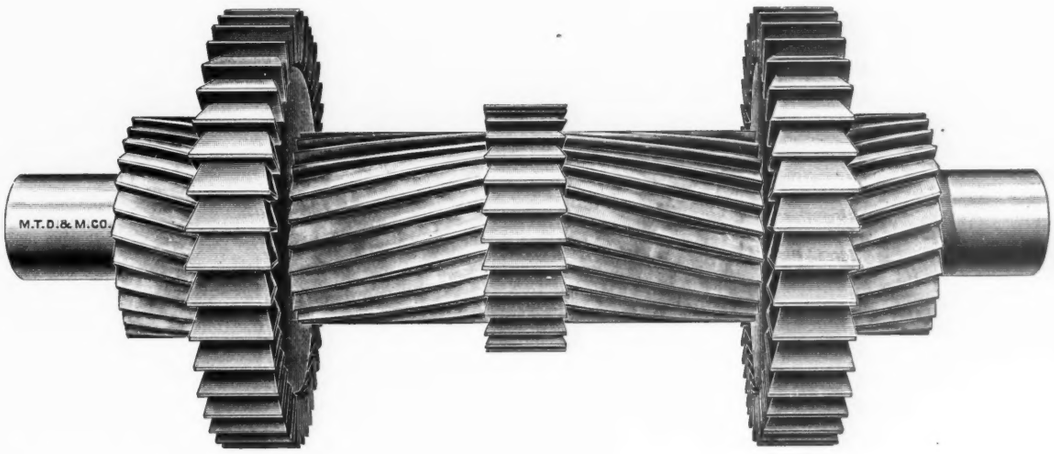

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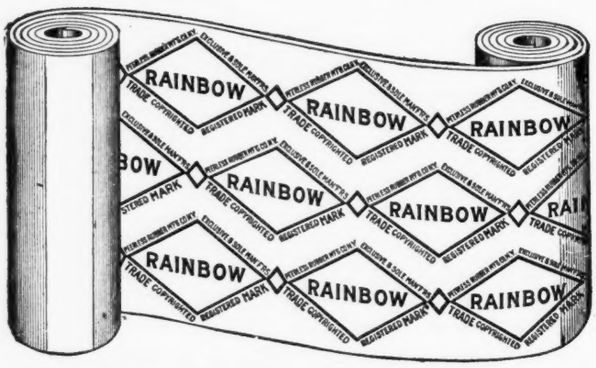

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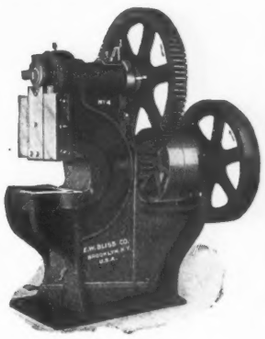

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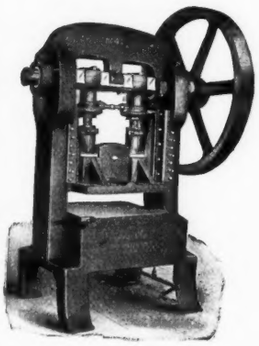

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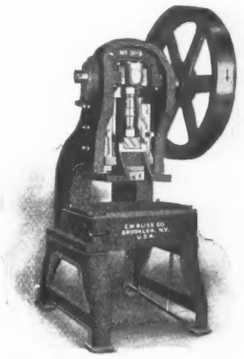

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An improved type of press with four rods—two at top and two at bottom—an arrangement which permits handling larger work than is practicable with the two rod type, and overcomes the eccentric strains that would otherwise result when work is not trued up. Three speeds can be obtained from the pump which is of the plunger type, and the Press is provided with all necessary valves, gauges, etc.

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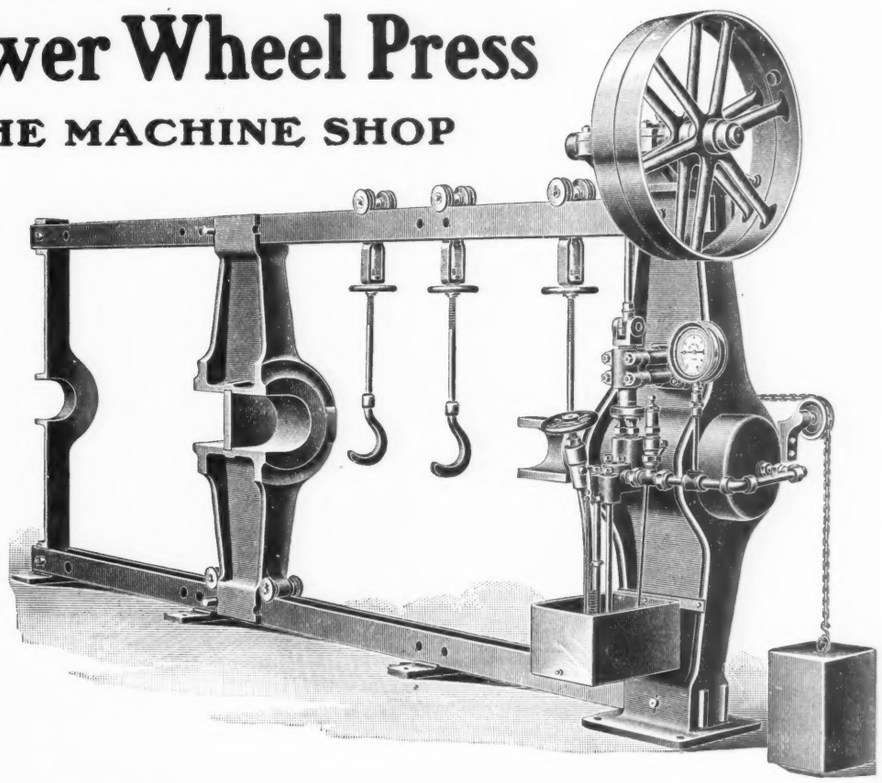

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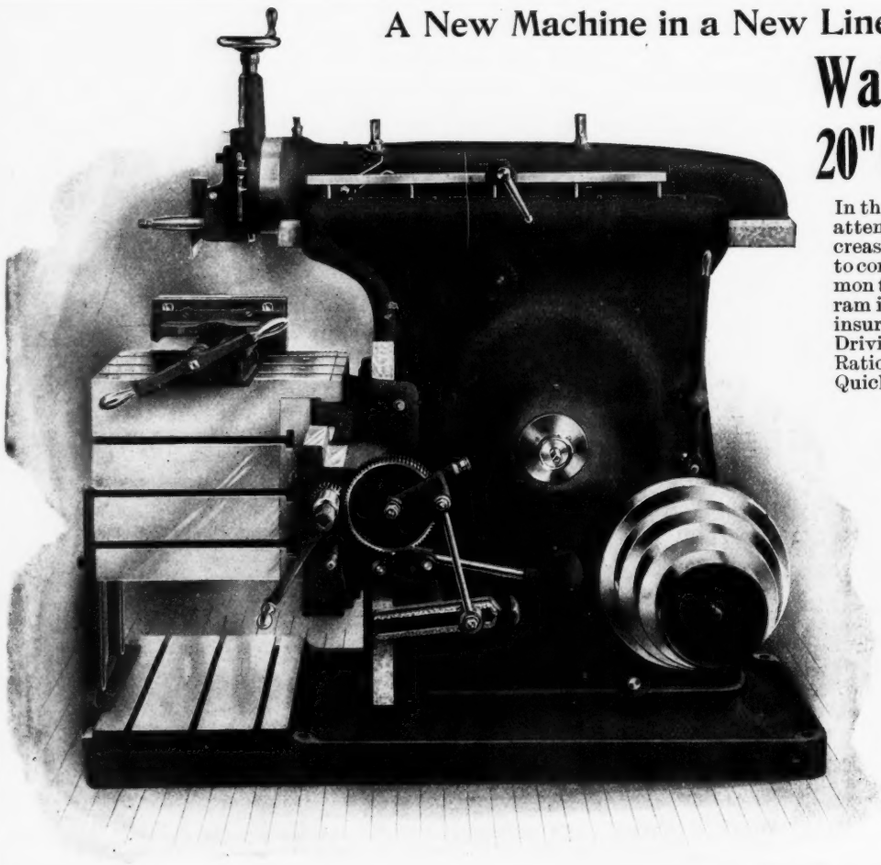

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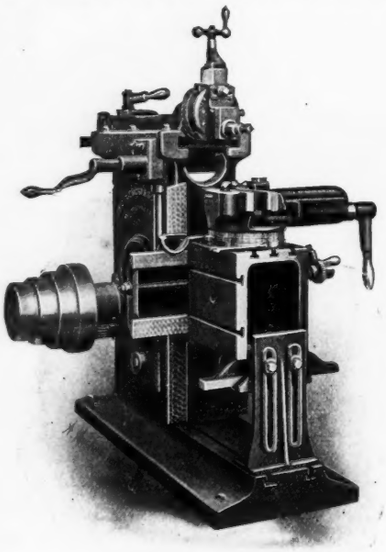

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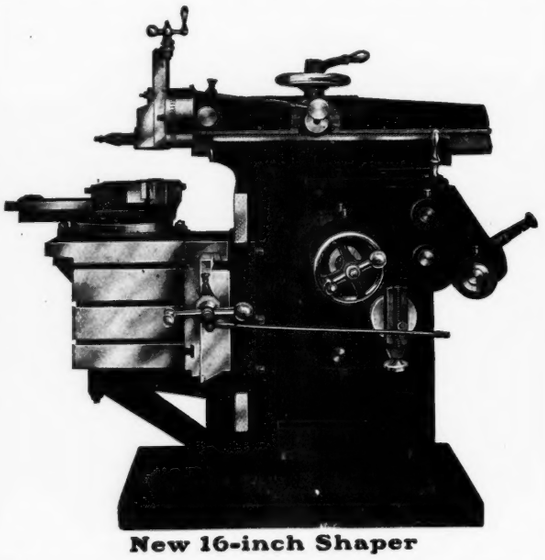

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This improved machine has down feed, which will feed either up or down, and needs no adjustment when length of stroke is changed; an absolutely uniform stroke, gear box giving ten different speeds, extra large bearing surface, requires no gibs and no countershaft and is altogether one of the most convenient and powerful shapers yet built.

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Our 24-inch B. G. Crank Shaper cutting cast iron 5-8 deep, 1-4 feed, 16 inches long. Our feed device alone makes them the most convenient shapers built.

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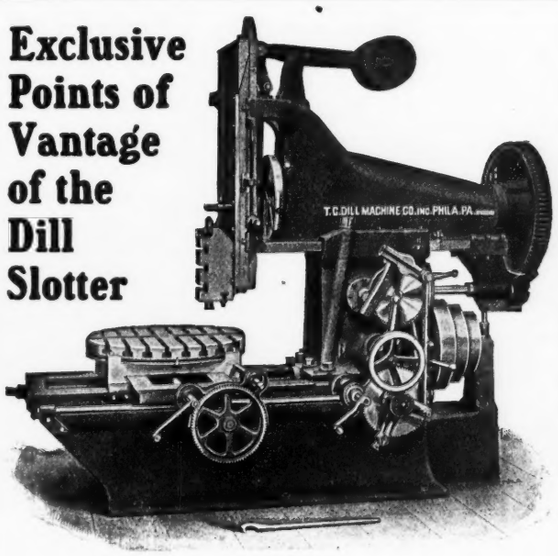

Traveling Head	New Intermittent Feed.
Improved Quick Return.	Table Graduated in Degrees.
Quick Traverse Gear.	Hand Wheel Controller.
Wide Range of Speeds.	Tool Post in Relief Apron.

And other features of construction that make it a power for the machine shop.

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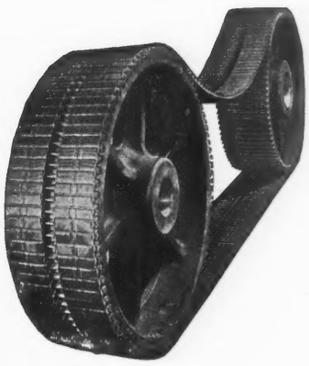

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Better than Belt-Drive

because it does not slip and can operate on shorter centers.

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See Catalogue No. 7 for other advantages.

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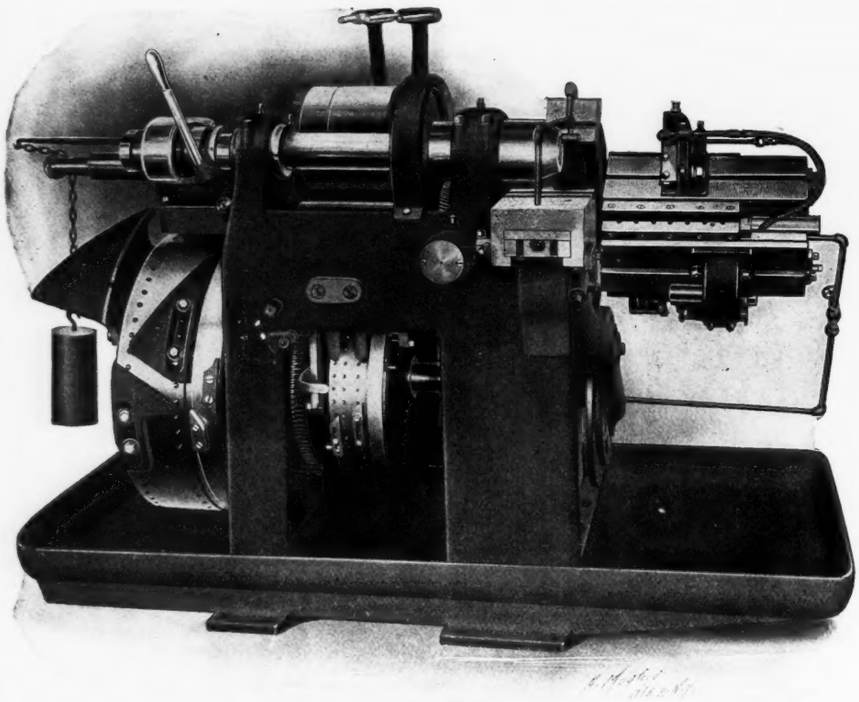

Has peculiar advantages that save time, increase output, permit high speeds, coarse feeds and heavy cuts, and over and above all make accurate product a certainty.

The widest range of work of any Automatic Turret Machine, and capacity for handling pieces of far greater length than any other.

Low labor cost—one man can operate several machines.

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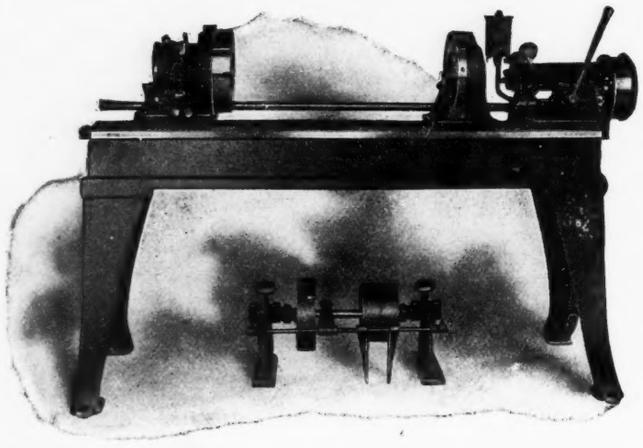
Revolving Centering Machine

For Accurately Centering Finished Shafts



The cut shows new REVOLVING CENTERING MACHINE—a large size of the well known machine of this type. It is heavier throughout and has capacity to center shafts up to 5 inches in diameter.

Constructed same as the smaller machine and embodies all the special features.

Circulars and prices sent upon application.

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OUR NEW 22" LATHE

Actual swing over bed **24".**

With 4-step cone, largest section 17-inch diameter, for 4-inch belt.
PATENT GEARED FEED, giving 8 changes without changing gears.

ACCURACY POWER SIMPLICITY

Write for circular giving complete details.

F. E. REED COMPANY, Worcester, Mass.

SELLING AGENTS — **MANNING, MAXWELL & MOORE, Inc., 85-87-89 Liberty Stroet. New York, N. Y.**
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Merrill Building, Milwaukee, Wis. Frisco Building, St Louis, Mo. Majestic Building, Detroit, Mich. Park Building, Pittsburgh, Pa.
Kirk Building, Syracuse, N. Y. Woodward Building, Birmingham, Ala. Tokio, Japan Mexico City, Mexico
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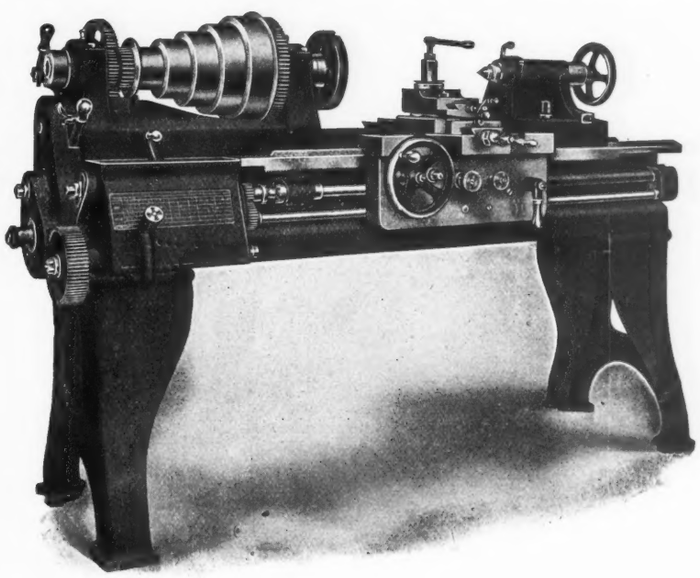
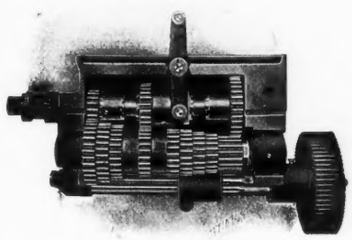
The Flather Quick Change Gear Lathe

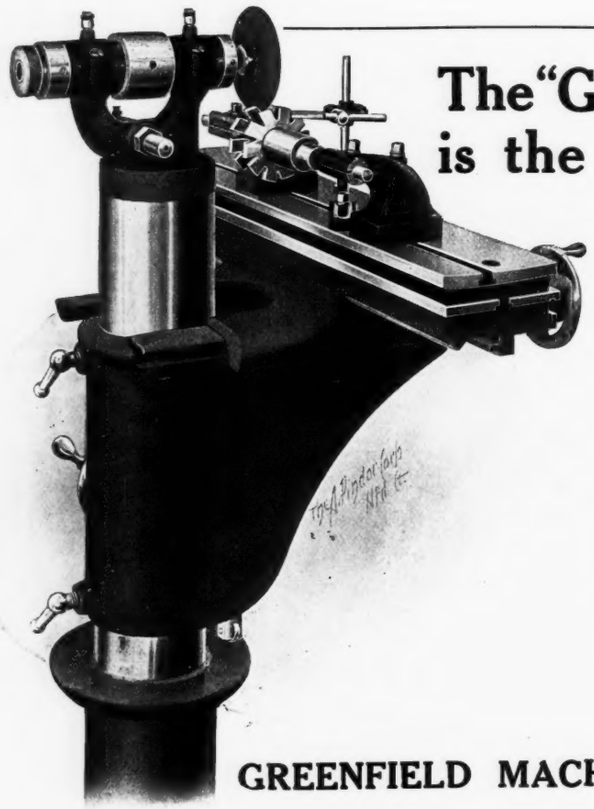
Latest and Best
Strong and Simple.
Greatest number of
Threads and Feeds.
Least number of Gears.

Send for descriptive circular.





Flather & Company, Incorporated, Nashua, N. H.



The "Greenfield" Universal is the Grinder Versatile

There is hardly a tool you can mention that cannot be effectively, quickly and easily ground on the

"Greenfield" Universal Grinder

It is adapted for a wide range of tool grinding, for cylindrical or conical work upon centers or in the chuck, for internal work and a variety of other grinding.

Full equipment of attachments furnished.

Send for Catalog.

GREENFIELD MACHINE CO., Greenfield, Mass.

Trade Mark.

LaSalle Tools

are built to obtain the best results with least expense for labor, in least time and in the simplest manner. They are strong, well fitted, durable, and are sold at a reasonable price.

LaSalle Bench Drill.

Micrometer Feed Surface Grinder.

The No. 1 Plain and Surface Grinder

should be in every tool room or general machine shop. The table is provided with micrometer feed, permitting the finest adjustments to be easily and quickly made; the range of work is wide and the product absolutely accurate.

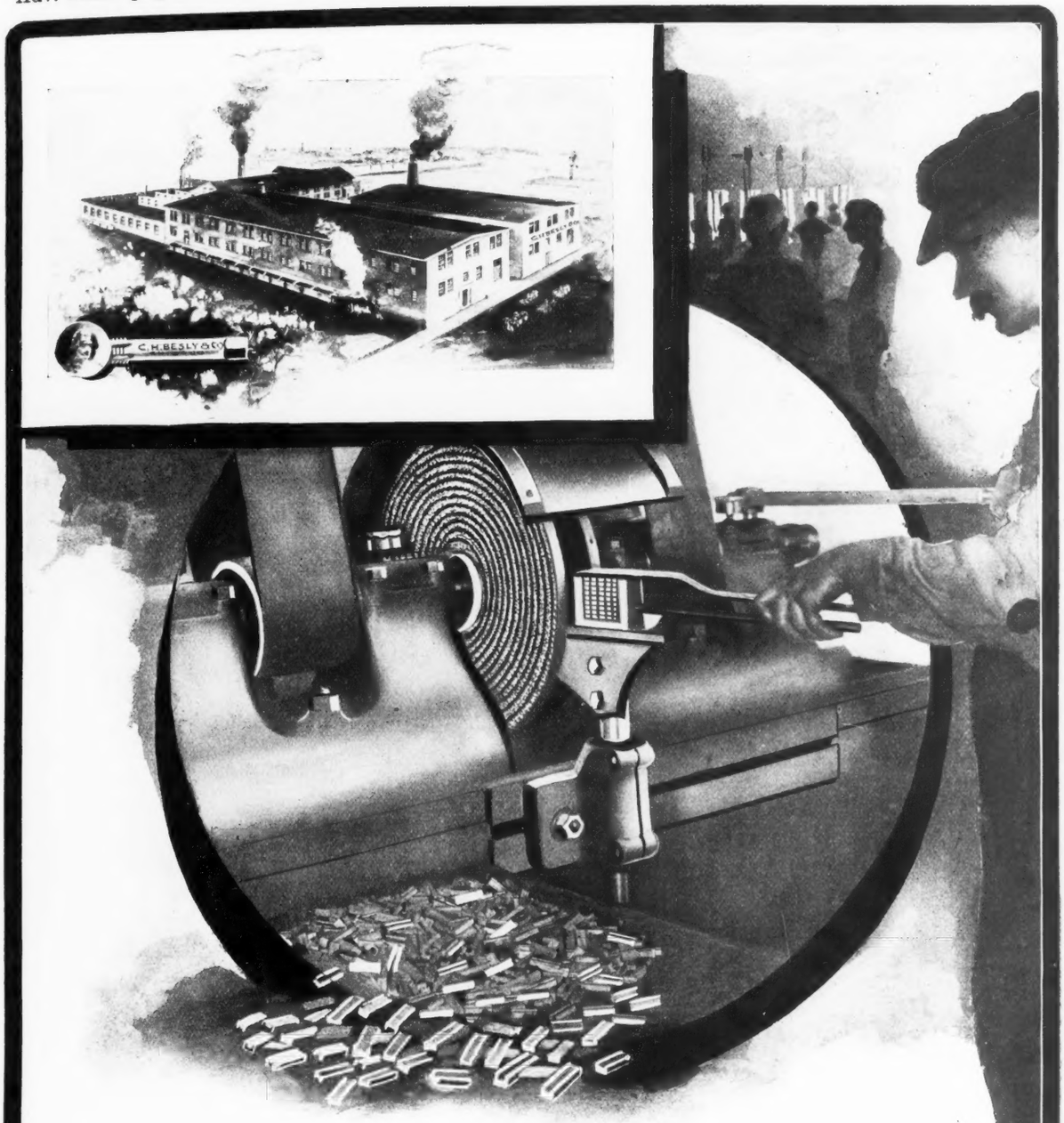
LaSalle Bench Drills and Bench Presses are also all-around tools for the every day shop.

Trade Mark.

WRITE FOR CATALOGUE

LaSalle Machine and Tool Company

LaSalle, Illinois, U. S. A.



BESLY GRINDERS

LET US SHOW YOU WHAT WE CAN DO FOR YOU

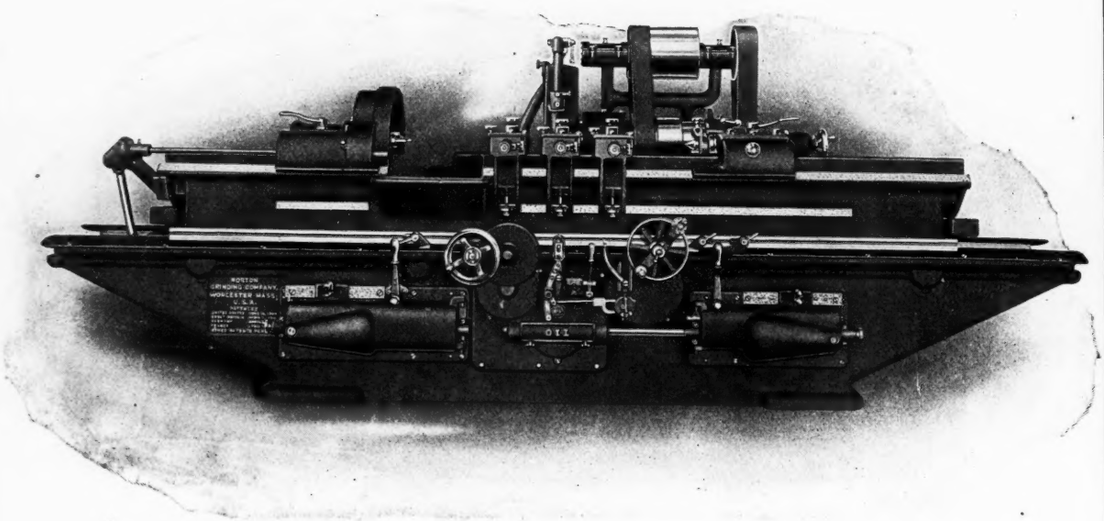
Illustration shows grinding ends of Lightning Arrester Carbons, 3/8″ x 3/16″ x 1 1/4″.
Ground on 1905 Model No. 6 Besly Grinder—Spiral Grooves.
Used No. 2330 Helmet Spiral Circle, grain No. 24.
Stock removed—about 1/4″.
Fixture holding seventy carbons.
Capacity of Machine is about 10,000 carbons, or 20,000 ends per hour. This would require several holders and helpers for loading.
The grinder leaves the ends square.

CHARLES H. BESLY & COMPANY

(ORIGINATORS OF DISC GRINDERS)

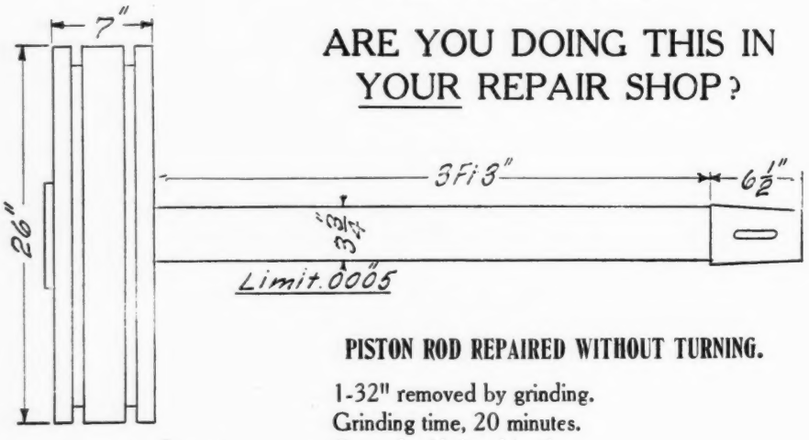
15-17-19-21 **So. Clinton Street,** CHICAGO, ILLINOIS, U. S. A.

Railroad Repair Shops Find NORTON GAP GRINDERS Profitable



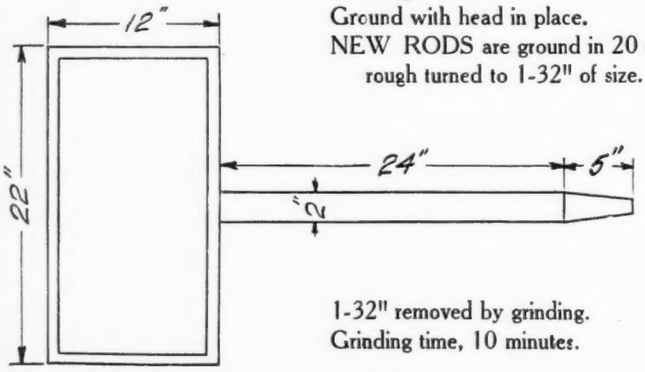
18 and 30 x 96 Norton Gap Grinder.

ARE YOU DOING THIS IN YOUR REPAIR SHOP?



PISTON ROD REPAIRED WITHOUT TURNING.

1-32" removed by grinding.
Grinding time, 20 minutes.
Ground with head in place.
NEW RODS are ground in 20 minutes, when rough turned to 1-32" of size.



1-32" removed by grinding.
Grinding time, 10 minutes.

Similar savings are made in grinding axles, crank pins, valve stems, etc.

Let us hear from you and we will show you how it is done.

Write for Catalogue N-7.

NORTON GRINDING CO., Worcester, Mass.

CHICAGO STORE: 48 South Canal Street.

EUROPEAN AGENTS: Ludw. Loewe & Co., Ltd., London, Berlin. F. W. Horne, Yokohama, Japan.

72-N.

NORTON

Norton Grinding Wheels are made of Alundum.

Grinding Information reprinted from booklet entitled "Helps-Don'ts"

To increase the speed of a grinding wheel gives the effect of a harder wheel; decreasing the speed gives the effect of a softer wheel.

For surface grinding, it is customary to run wheels at a somewhat slower rate of speed than for general grinding. A speed of 4,000 to 5,000 surface feet is usually employed.

Wheels are run in actual practice from 4,000 to 6,000 feet per minute.

Speed up the spindle as the diameter of the wheel is decreased. Approximately the same periphery rate should be maintained as the wheel wears down.

Transferring a wheel after worn down to a small diameter, from a large machine to a small one, is a good plan.

—*From Booklet: "Helps-Don'ts."*

"Helps-Don'ts" is a booklet full of valuable points on Grinding; information on the selection of the right grinding wheels for the work, mounting and truing wheels, operating speed, care of wheel, etc.

Grinding Points Ground Down for the benefit of all who grind—for foremen, for superintendents. It contains information based on many years of "Norton Experience" in the manufacture and use of grinding wheels and grinding machinery.

It will be sent without charge to anybody. Send a postal now.

Norton Company

Grinding Wheel Works, Worcester, Mass.

NEW YORK OFFICE: 26 Cortlandt Street, Havemeyer Bldg.
CHICAGO STORE: 48 South Canal Street.
ALUNDUM PLANT: Niagara Falls, N. Y.

F 50

The Man is Worth More than the Machine

That's why Carborundum Grinding Wheels save money in every shop into which they are introduced. They increase the efficiency of the man—enable him to do more work and better work in a day—hence decrease the cost of production. There's a Carborundum Wheel to meet every grinding requirement.

THE CARBORUNDUM COMPANY
NIAGARA FALLS, N. Y.

YOU CAN SAVE MONEY

BY BUYING A

Wells Grinder

BECAUSE

You buy only the equipment wanted for your particular work. You can afford to keep a machine always ready for grinding all or any kind of tools.

We will gladly tell you more about it.

F. E. WELLS & SON COMPANY
GREENFIELD MASS. U.S.A.
Wells

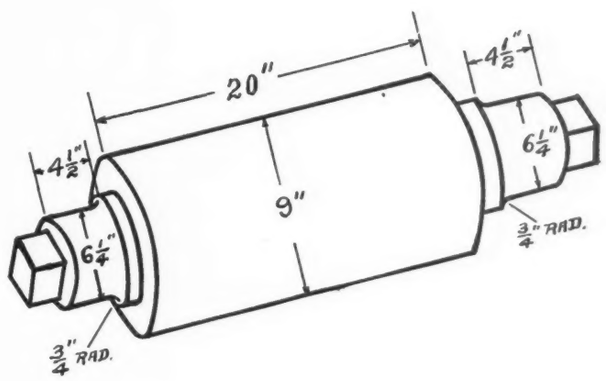
Do Your Grinding with Landis Machines

Grinding Tin Foil Rolls on a 12" x 42" "Landis" Plain Grinding Machine

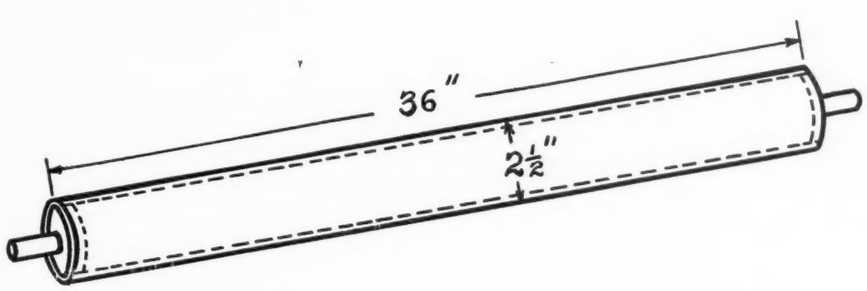
These rolls are CHILLED iron. 1-32" metal was removed from the diameter.

The roll face and journals including the fillets were ground to a fine finish, ready for use; requiring no extra polishing.

Time taken to grind one roll complete 1 1-2 HOURS.



Grinding Hollow Rolls from the Rough



This job was done on our 12" x 42" "Landis" Plain Grinder.

These rolls were made of mild steel, the walls being only 3-32" thick. .050" metal was removed from the diameter and they were ground to a fine finish, to within .0005" of size in 25 MINUTES A PIECE.

LANDIS TOOL CO., Waynesboro, Pa.

AGENTS—Marshall & Huschart Machinery Co., Chicago, Ill. Walter H. Foster Co., 50 Church St., New York. C. W. Burton, Griffiths & Co., London. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg Copenhagen and Budapest. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan and Bilbao. A. R. Williams Machinery Co., Toronto. Williams & Wilson, Montreal, Canada.

Mr. Buyer

(The dogs are after you.)

Aug. the hot.

Dear Sir:

If now you are selling cast wrenches with otherwise high class machinery product we can, in many cases, give you tools that will match your machines—high class drop-forged wrenches—and probably save you money besides. We are making more than 32 classes covering entire range of uses. Oblige us and help yourselves by sending list of sizes and quantities used and we will hustle to place satisfactory reply in your hands. Catalogue "B" free.

J. H. WILLIAMS & CO.
SUPERIOR DROP-FORGINGS
BROOKLYN, N. Y. CITY

"At the Sign of the Lion."

MONARCH GRINDING WHEELS

Are so bonded that they combine the greatest degree of porosity with the greatest strength of texture—

Excel in cutting properties because of even temper secured by merging of proper abrasives under proper heat—

Are graded to suit every need requiring rapid and effective work—

Are free cutting, dependable and and durable.

May be used wet or dry—odorless, dustless, and never heat when properly graded.

Made in all sizes and in all face shapes.

We have a catalogue for you.

Monarch Emery and Corundum Wheel Co.
CAMDEN, N. J., U. S. A.

STERLING
Emery and Corundum
WHEELS

Write us your requirements in this line. Our wheels are graded to suit every kind of work. They are fast cutting, non-glazing, and equally effective on wet or dry grinding.

Sterling Emery Wheel Mfg. Company
Factory and Offices: TIFFIN, OHIO
BRANCHES: New York House, 45 Vesey St. Chicago House, 60 W. Washington St.
San Francisco House, 461 Market St.

It Is Shop Economy

to have a **Cut-Meter** for every machine tool. With this device at hand there is no excuse for speeds below the standard. It is simple, requires no timing or calculation; adaptable, can be used on any machine; convenient, can be held in any position—and shows the operator instantly and exactly, the cutting speed in feet per minute at which his machine is running.

Built for hard service and will save its cost a hundred times over in a year.

Send for catalogue.

Warner Instrument Company
56-59 Roosevelt Avenue, BELOIT, WIS.
1691 Broadway, New York. 153 Federal St., Boston.

The King Machine Tool Company.
CINCINNATI OHIO U.S.A.
VERTICAL TURRET BORING AND TURNING MACHINES

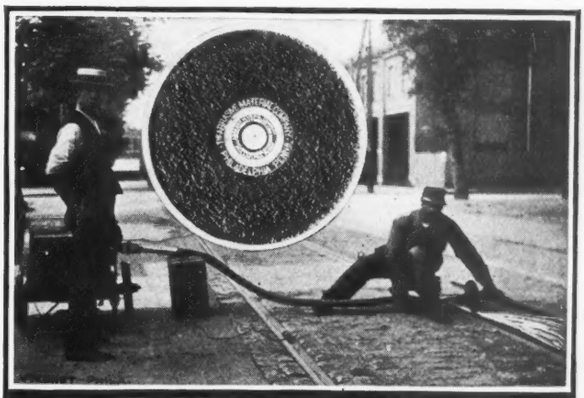
VITRIFIED CORUNDUM WHEELS

THE COOLEST CUTTING WHEELS

on the market and the most satisfactory on every other count. Made from almost pure corundum, by the vitrified process, they are 50 per cent. more efficient than other abrasive wheels, cut faster and cleaner, will not glaze and never draw the temper of the tool being ground.

Sent on trial when desired.

Vitrified Wheel Company
WESTFIELD, MASS.



ABRASIVE

Grinding Wheels Work Fast

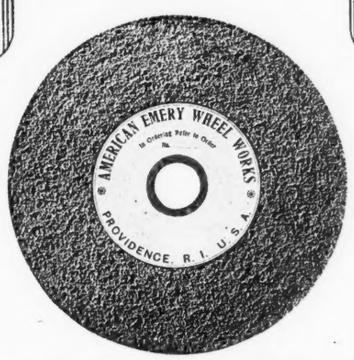
That's why they are preferred for grinding car tracks where as much work as possible must be done between cars.
For the same reason they are time and money savers wherever used; also, **they cut cool,** and there is little chance to spoil the work. Equally adapted and designed for the heaviest or the finest and most exact service.

Illustrated catalog and individual grinding advice free on request.

ABRASIVE MATERIAL CO.
PHILADELPHIA, PA.

AGENTS: H. A. Stocker Machinery Co., Chicago, Ill. R. Sonnenthal, Jr., Berlin, Cologne and Vienna. Wilh. Sonesson & Co., Malmo and Copenhagen. Glaenzer Perreaud & Thomine, Paris, France. R. d'Aulignac, Barcelona, Spain.

AMERICAN



Corundum Wheels and Emery Wheels

Made in every grain, and grade of hardness, and by every process. Accurately tested, balanced and graded, and absolutely uniform, they represent

The Highest Possible Efficiency.

Every wheel that leaves our works carries with it our guarantee that it will be **entirely satisfactory** for the operation for which it is furnished.

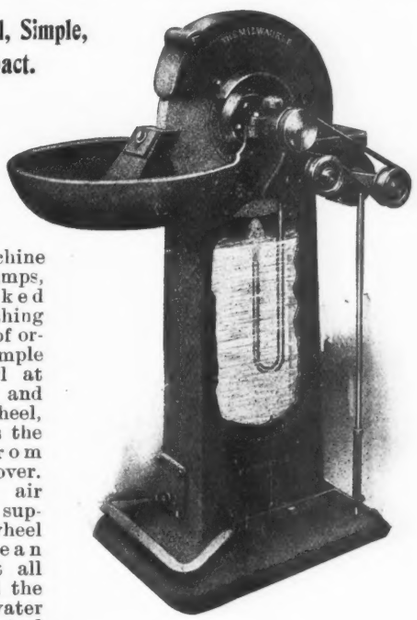
Write for copy of new Catalog.

American Emery Wheel Works
Providence, R. I., U. S. A.

"Milwaukee" Wet Tool Grinders

Substantial, Simple, Compact.

Ready, Reliable, Efficient.



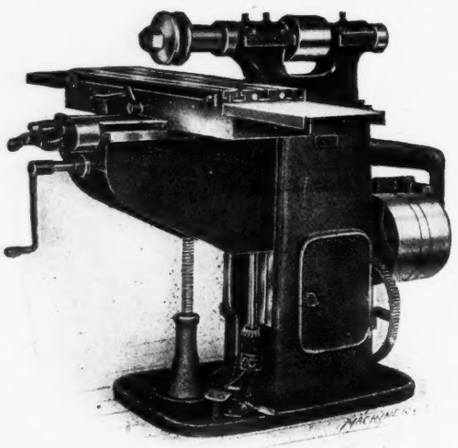
This machine has no pumps, no packed joints, nothing to get out of order. An ample sized bowl at the front and sides of wheel, prevents the water from slopping over. A patent air jet device supplies the wheel with clean water at all times, and the supply of water is regulated and controlled by a convenient foot treadle.

It will pay you to investigate.

Lutter & Gies, Milwaukee, Wis.

AGENTS—E. L. Essley Machine Co., Chicago. O. L. Packard Mchy. Co, Milwaukee. Vandyck, Churchill & Co., New York City. Chas A. Strelinger, Detroit, Mich.

Saxon Surface Grinders



Produce accuracy on flat work AT A LOW COST.

This is due to their strength and durability.

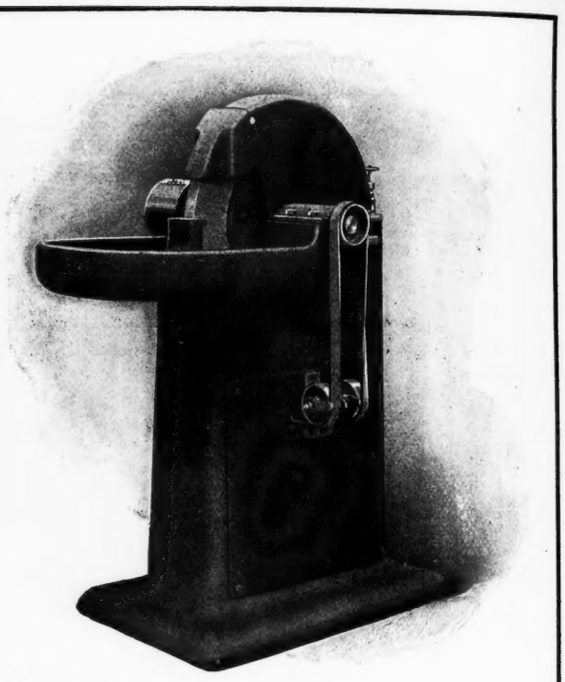
They will also finish work from the rough material where a small amount is to be removed, and do it economically.

They save money in the tool room and in the shop.

A better knowledge of what they will do, put into use, will help your bank account very materially.

Your request secures the information.

SAXON MACHINE COMPANY
HOLYOKE, MASS.

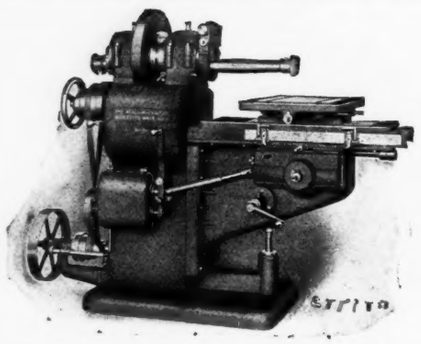


Has all self oiling boxes. Countershaft has half turn rod for shifting belt.

No spattering. Water control is perfect.

Ransom Mfg. Co., Oshkosh, Wis., U. S. A.

European Agents: Ludw. Loewe & Co., Berlin, Germany.



COMMERCIALLY

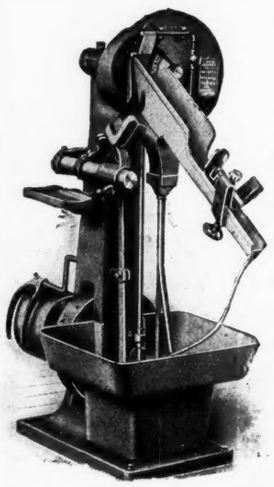
There is but one way to obtain Round Holes, Straight Holes, and Holes of uniform diameter. That is by GRINDING.

For this work, the **HEALD CYLINDER GRINDER** is especially designed and altogether satisfactory, rapid in operation and accurate to within .00025" limit. It leaves a smooth, hard surface unapproached by any other method.

GAS ENGINE MANUFACTURERS

You will find this machine the solution of the problem "How to Obtain a Round and Straight and Smooth bore to your cylinders, at a minimum cost." Can we post you further?

THE HEALD MACHINE CO.
Station D-2, Worcester, Mass.



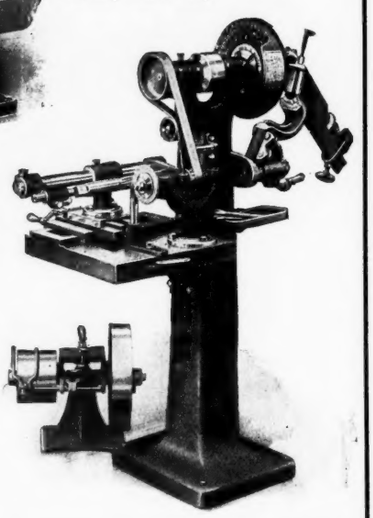
Two New Yankees

Wet drill grinder with capacity up to 3½" drills. We make both smaller and larger sizes; also dry grinders of all sizes and types.

The **New Yankee** Line covers every shop condition—50 styles.

You can't grind drills by hand and do it perfectly.

A bright boy can do a perfect job with a **New Yankee** Drill Grinder and do it quicker than your best mechanic could do any kind of a job in any other way.



Style "F" Wet Drill Grinder and Combination Cutter, Reamer and Drill Grinder style "BX."

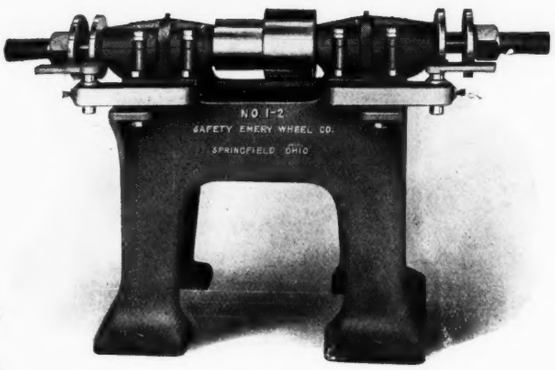
An ideal tool grinder for the small shop and department tool room in a large shop.

It has a range which compares favorably with machines costing $300.00 to $500.00 and does its work just as well and conveniently. It grinds drills in the **New Yankee** way too.

The cost is a trifle.

Wilmarth & Morman Co.
580 Canal St.,
Grand Rapids, Mich.

Yours for General Grinding



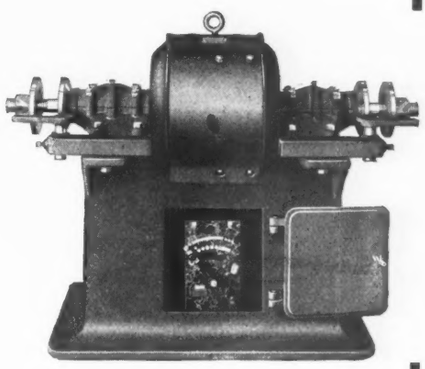
Belt-Driven Floor Grinder

Specially designed for general grinding. Built solid and substantial. Extra long self-oiling, dust-proof bearings, but FREE FROM LOOSE OILER RINGS TO WEAR SPINDLE. Abundant space between wheels. Rests easily adjusted. Countershaft provided with self-oiling boxes.

Motor-Driven Floor Grinder

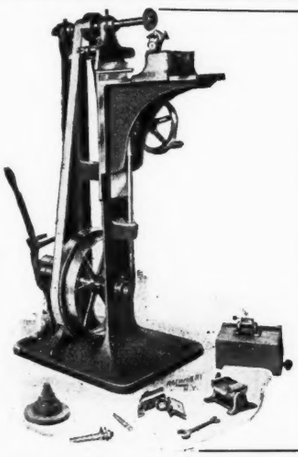
Compact and efficient. Constructed upon lines of greatest rigidity and adapted to the modern methods of electric drive. Motor armature is mounted upon wheel spindle which runs in extra long ring oil, dust-proof bearings. Motor is fully enclosed and receives proper ventilation from large base beneath, in which is located starting box and speed regulator. Our motors are built specially for this type and are equal in every respect to any on the market.

Our New Catalog No. 6-M gives details.



The Safety Emery Wheel Company, COLUMBUS AVENUE, SPRINGFIELD, OHIO.

J. R. Baxter & Co., Montreal, Canada. Pfeil & Co., London. V. Lowener, Copenhagen. Adler & Eisenschnitz, Milan. De Fries & Co., Akt. Ges., Dusseldorf, Berlin, Wein and Paris.



Perfectly Accurate Threads

can never be obtained with hand-ground chasers, because it is impossible to give each one the same angle. For good results it is necessary that all the chasers in a set be ground exactly alike, and the

Wallace Chaser Grinder

accomplishes this to perfection. Being accurately ground, each chaser does its proper share of work, does it well and wears five times as long as if ground by hand. The grinder is simple in construction, easy to operate and a time and money saver. For full details write

MODERN TOOL COMPANY, ERIE, PA.

Also manufacturers of Self-Opening Die Heads, Solid Dies, Tap and Die Holders, and Tapping Attachments for Drill Presses.

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Complete line carried in stock for immediate delivery.
Write to nearest office for catalogs and prices.

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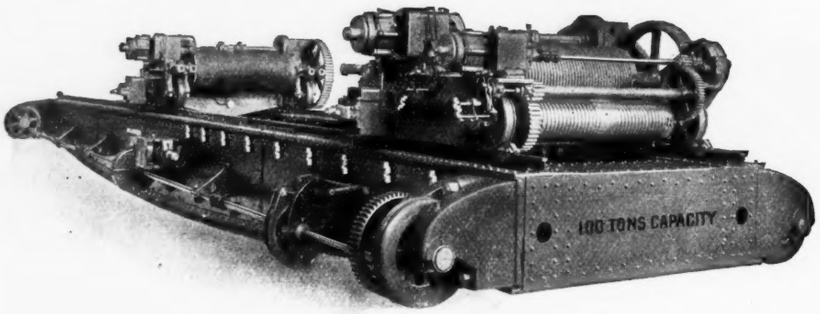
NEW HAVEN, CONN.



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THAT GIVE SATISFACTION AT ANY SERVICE

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SHAW

Electric Traveling

CRANES

All Types and Sizes for ALL Purposes

Dependability

is the main requisite of a crane. A crippled crane may cripple your entire plant. In buying a crane remember that SHAW Cranes are Dependable Always.

Never Buy a Crane Before Investigating the Shaw

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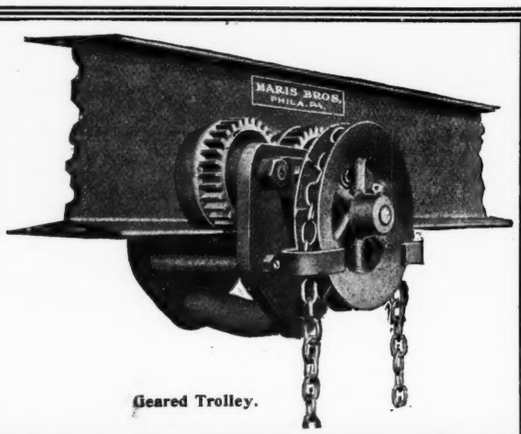
Plain Trolley.

TROLLEYS

FOR

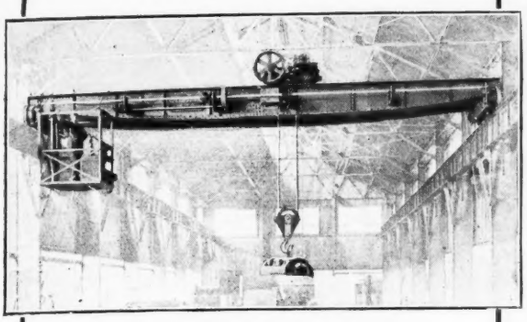
I BEAM TRACK



Geared Trolley.

MARIS BROS., Philadelphia.

CLEVELAND CRANES



YOUR MONEY

In the selection of any piece of machinery it is highly essential that a maximum of reliable power be secured at a minimum cost.

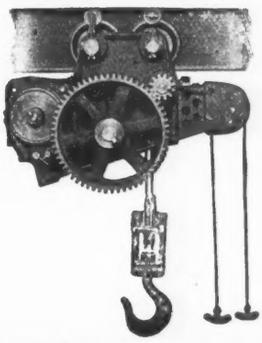
The experience, material and workmanship put into Cleveland Cranes make them the most durable and efficient cranes on the market today.

Your money in "Cleveland Cranes" will purchase lasting, A1 crane service.

Write for estimates.

The Cleveland Crane & Car Company
WICKLIFFE, OHIO

ELECTRIC HOISTS



NORTHERN CRANES

Traveling, Locomotive, Jib and other varieties
Electric, Hand or Steam

Get Catalogue

NORTHERN ENGINEERING WORKS
26 Chene St., DETROIT, MICH., U.S.A.
NEW YORK: 120 Liberty St. PHILADELPHIA: Land Title Bldg.
CHICAGO: 405 Monadnock Blk.

GISHOLT

New Machine Tools

TAKE a look over your machine tools. You will soon have to make some replacements—some additions. You *need* new tools.

How about your engine lathes? Have you been using them for a class of work you should have done on Gisholt Lathes? One Gisholt, you know, will do as much chucked work as two to four engine lathes. There's twenty years of successful experience in "making good" behind that statement.

Why not ask what we can do for you?

Ask about Gisholt Lathes, Boring Mills and Tool Grinders. A new booklet we have issued recently will interest you. Write for it.

Gisholt Machine Company

Works: MADISON, WIS. and WARREN, PA.
General Offices: 1316 Washington Ave., Madison, Wis.

FOREIGN AGENTS: Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Schuchardt & Schutte, Vienna. St. Petersburg, Stockholm, Berlin. C. W. Burton, Griffiths & Co., London, England.

The Peerless Hoist

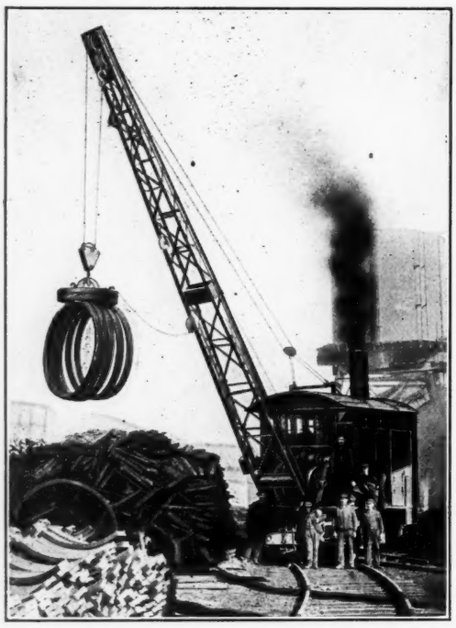
The latest type of spur geared hoist embodying special features that make it the most efficient device of its class.

Safety, Durability Speed and Power

are prominent characteristics of the "Peerless"—all qualities that go to make up the perfect hoist. The single load chain tends to light weight and compact form; all working parts are protected by dust proof cases; the hoisting mechanism—a train of compound balanced steel gears—insures smooth action and reduces wear to the minimum; and all danger of the load slipping is eliminated by a chain guide and stripper.

We shall be glad to furnish full particulars on request.

Edwin Harrington, Son & Co., Inc.
Philadelphia, Pa., U. S. A.



BROWNING
Locomotive Crane

Lifting 72-inch locomotive tires with a Browning 48-inch Magnet.

Browning Locomotive Cranes operated by steam, electricity or any desired motive power. Designed for railroad work, stone quarries, industrial plants, etc.

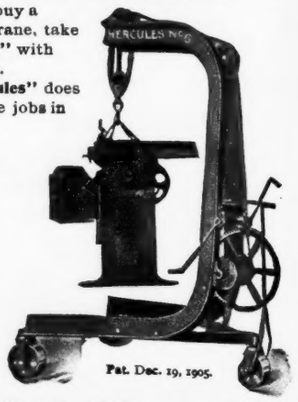
Write for special Bulletins.

THE BROWNING ENGINEERING CO., Cleveland, Ohio

Hercules Portable Crane and Hoist
The Modern Model

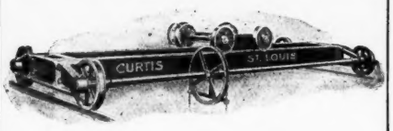
When you buy a Portable Crane, take a **"Hercules"** with Steel frame.
The **"Hercules"** does all the crane jobs in the quickest, easiest way, with least labor.

Standard Sizes.
Specials to Order.
Circular on request.



William S. Nicholls, 254 Broadway, New York

Curtis Double Beam Cranes



Made up to 24,000 pounds capacity and 40-foot span.
Crane and Trolley Wheels large in diameter and bushed with roller bearings.
All parts figured with large factor of safety.

Curtis Air Hoists
Curtis Automatic Belt Driven Compressors
Curtis Pneumatic Elevators
Curtis Roller Bearing Trollies.

Curtis & Co. Mfg. Co., St. Louis, Mo.
OPERATORS OF THE ST. LOUIS STEEL FOUNDRY
New York Office: A. E. Hoermann, M. E., Hudson Terminal, 30 Church St., Room 530.
Agent: A. Baldini & Co., Pontedera, Italy.

HAND POWER
TRAVELING CRANES
Overhead Tracks, Trolleys, Switches, Turn Tables and Chain Hoists.

Reading Crane and Hoist Works
READING, PA.

No depression with us. Running full time.

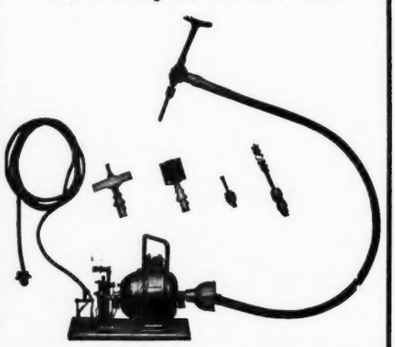
WHY?

We build the best cranes for the least money.

CRANES
all types — any capacity.

ALFRED BOX & COMPANY, Philadelphia, Pa.

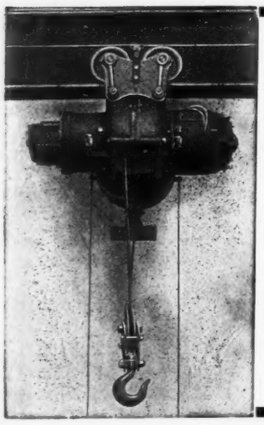
The Stow Flexible Shaft
and Ready Electric Motor



Constitute an ideal portable outfit with which to drill, ream, tap, grind or polish.
Wide radius of action, and **great adaptability** to **awkward conditions** are combined with all **the other advantages** offered by power driven machines.
Save money in your shop by doing away with slow and costly hand methods.

Illustrated Catalogue free on request.

STOW FLEXIBLE SHAFT CO.
Philadelphia, Pa.



Filling three ample sized reservoirs enables a

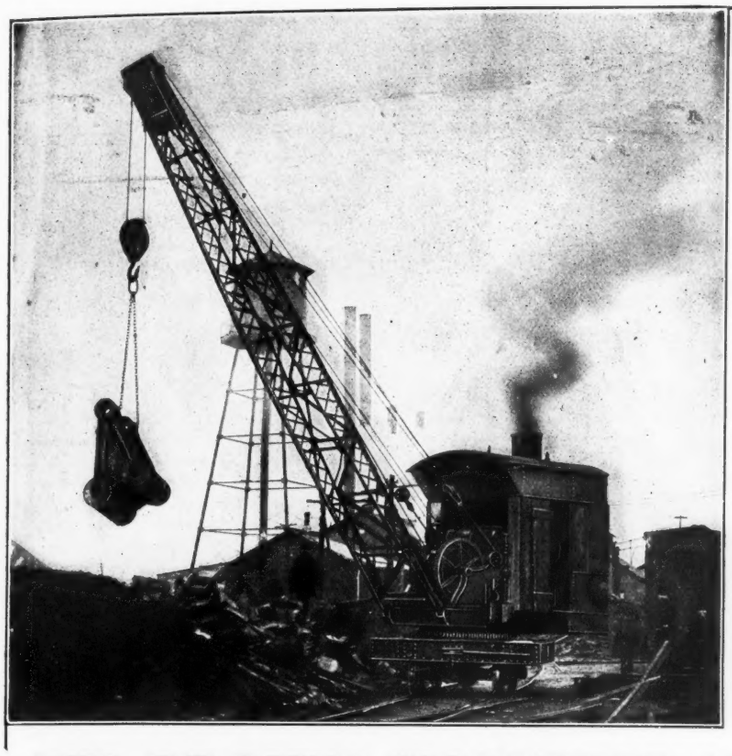
Shepard Electric Hoist

to oil itself automatically. The oil is kept in and dirt is kept out.

WRITE FOR BULLETINS.

Shepard Electric Crane & Hoist Co.
General Offices and Works, Montour Falls, N. Y.
New York. Philadelphia. Pittsburgh. San Francisco. Toronto. Montreal.

DATA SHEET BINDERS
New Binders for MACHINERY Data Sheets, adapted to hold any number. Red cloth, black lettering. Price 35 cents, post paid.
The Industrial Press, 49-55 Lafayette Street, New York



"BROWNHOIST"

10-ton Standard Locomotive Crane in the yards of the American Steel Foundries at Pittsburg, Pennsylvania.

WRITE US FOR CIRCULAR "I."

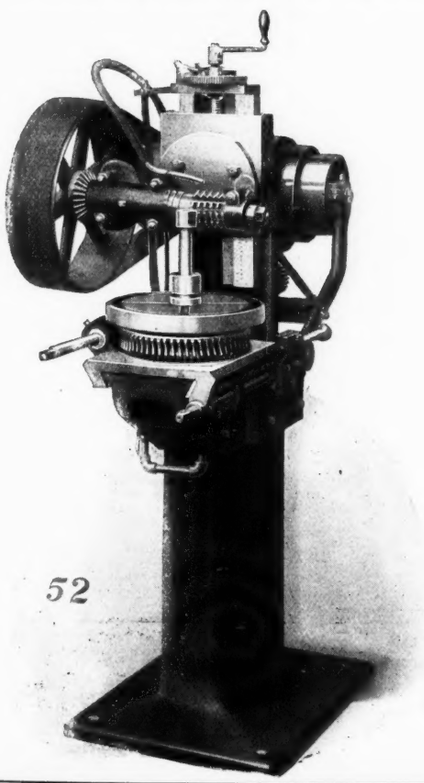
THE BROWN HOISTING MACHINERY CO.

Engineers, Designers and Manufacturers of Hoisting Machinery of all descriptions

BRANCH OFFICES:
Pittsburg and New York

Main Office and Works: CLEVELAND, OHIO

Automatic Gear Hobbing Machine



The Farwell Gear Hobbing Machine

requires no attention besides the setting of the blanks and removing the finished gears.

The Feed Stops Automatically

at the end of the cut.

And Best of All

the teeth are formed theoretically correct.

SEND FOR LITERATURE

The Adams Company

DUBUQUE, IOWA, U. S. A.

AGENTS: De Fries & Co., Dusseldorf, Germany. G. Koeppen & Co., Moscow, Russia. J. Lambercier & Co., Geneva, Switzerland. V. Lowener, Copenhagen, Denmark. Aktiebolaget V. Lowener, Stockholm, Sweden. Glaenzer, Perreaud & Thomine, Paris, France.

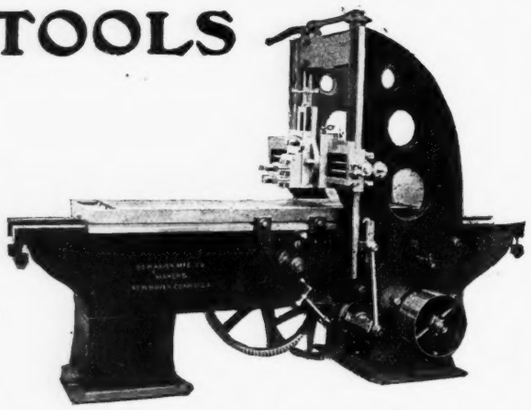
THE NEW **POWELL** HIGH SPEED **ACCELERATING CUT PLANER**

WILL INCREASE YOUR PLANER OUTPUT

The Acme of Perfection in Planer Design and Construction.
The result of thirty years experience in designing and building Planers.
Built like a watch. Interchangeable parts. Handiness in manipulation. Ease in operation. Increase in output.
Sizes: 16″-20″-22″-24″-28″-30″. Any length. Prompt deliveries.

POWELL TOOL COMPANY, WORCESTER, MASS.

"NEW HAVEN" TOOLS



Improved 24-inch Planer

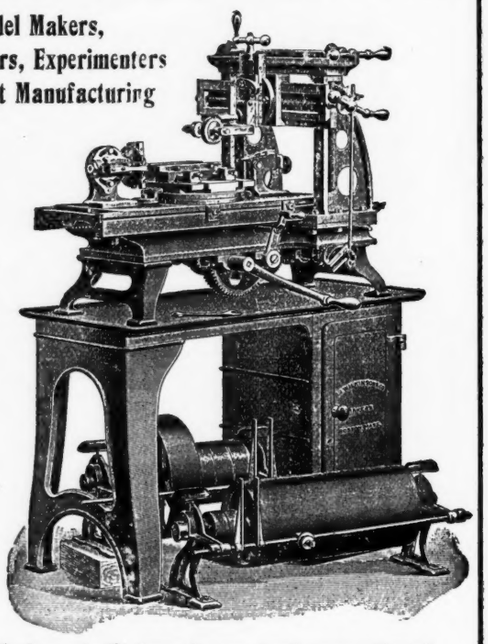
Strong and rigid, driven by two belts, giving a very steady motion. Head provided with automatic power feeds in all directions. Every convenience for rapid operation. Planes 5 and 6 feet (inside the pockets) 24 inches wide and 24 inches high.

Manufactured by
NEW HAVEN MANUFACTURING CO.
New Haven, Conn.

Improved Power or Hand Planer

For Model Makers, Amateurs, Experimenters or Light Manufacturing

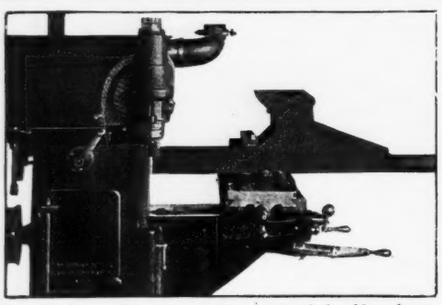
Mounted on Heavy Cabinet Base



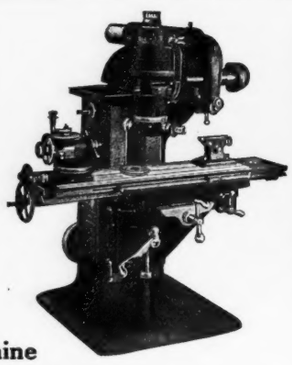
A small planer built from heavy, well proportioned patterns. Double Lifting Screws. Quickly adjusted round planer chuck with graduated base and 7″ planer centers. Efficient, durable and easily changed from power to hand crank.

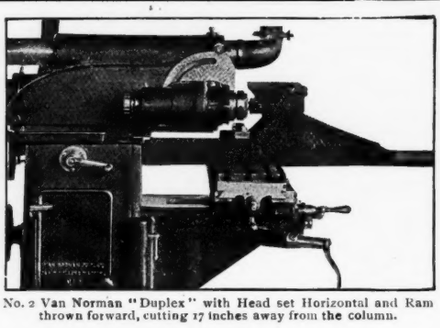
Write for full description.

A. J. WILKINSON & CO.,
180 Washington Street, BOSTON, MASS.



No. 2 Van Norman "Duplex" with Head set Vertical and Ram drawn back, cutter operating close to the column of the machine.





No. 2 Van Norman "Duplex" with Head set Horizontal and Ram thrown forward, cutting 17 inches away from the column.

Van Norman "Duplex" Milling Machine

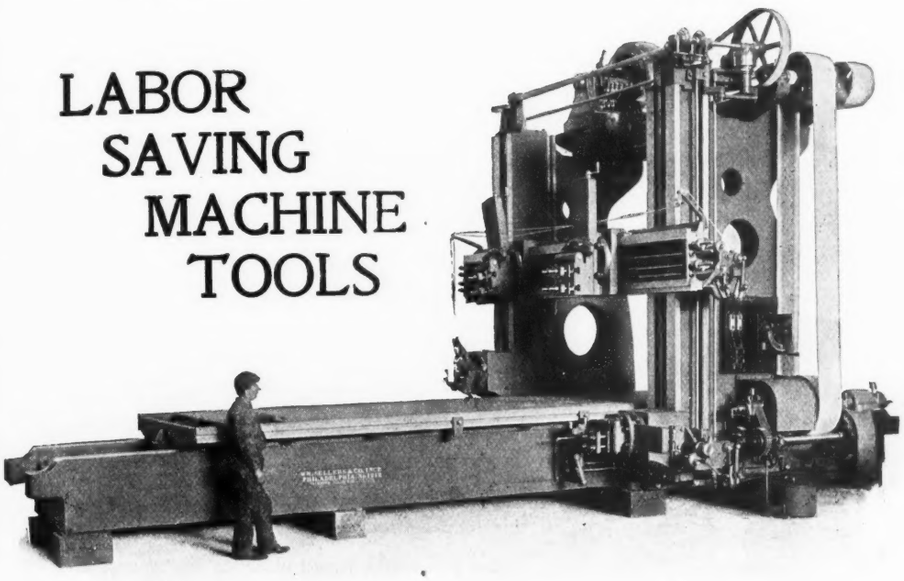
Cutter spindle will operate in VERTICAL and HORIZONTAL positions and at ANY ANGLE. The most universal machine on the market, indispensable for Tool Room purposes, and an all-around manufacturing machine. We make 3 sizes. *Mention August MACHINERY.*

WRITE FOR NEW CATALOG.

WALTHAM WATCH TOOL COMPANY
Springfield, Mass., U. S. A.

William Sellers & Co., Incorp. Philadelphia, Pa.

LABOR SAVING MACHINE TOOLS



PNEUMATIC CLUTCH PLANING MACHINES

Noted for remarkable uniformity of reverse without shock.

Driven by non-shifting belt running always in same direction.

Variable cutting speed.

Constant return.

Crosshead extended back between uprights and secured front and rear. Patent feed motion. Uprights of heavy box form.

Bed and table of improved heavy pattern.

Ways lubricated by power pump.

Catalogue No. 700 mailed on request.

CRANES - INJECTORS - SHAFTING - TURNTABLES - ETC.

A PLANER is a tool which is not bought often, does not wear out and is therefore bought only after careful consideration.

We know this, and want the closest investigation by prospective users, for it is then that we have the better opportunity to interest a client permanently.

The "Cleveland" Open Side Planers

are built for use, to do accurate work and lots of it, not for today and tomorrow, but indefinitely, with proper care.

The box section design is the strongest possible and is used throughout in Bed, Column and Cross-rail.

If you are considering a planer of any type you ought to look into the "Cleveland" for your own interest, it may surprise with its simplicity and accuracy.

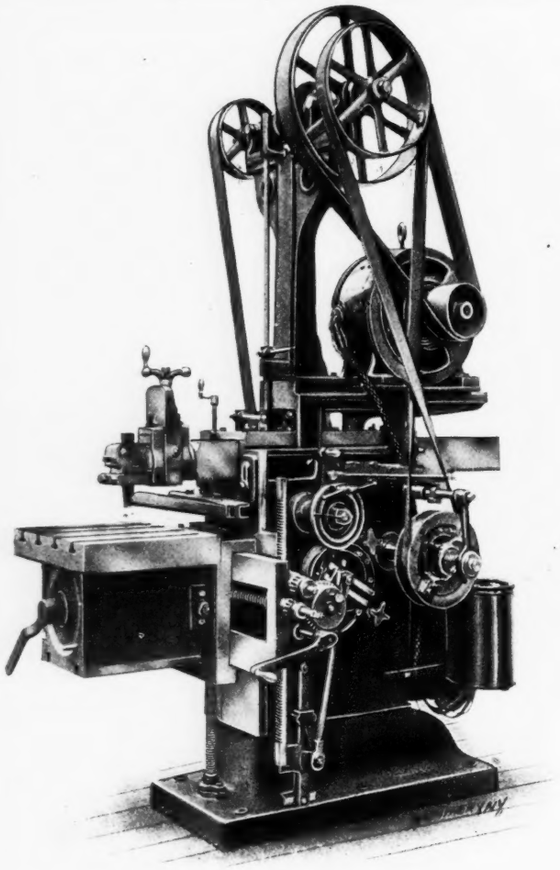
When you think Planer—think "Cleveland."

MANUFACTURED BY

The Cleveland Planer Works

JAMES G. DORNBIRER GEO. W. FORD

3150-3152 Superior Ave., CLEVELAND, O., U. S. A.



Morton's New Improved 26-inch Draw-Cut Shaper

Is equipped with Rotating Box Table, instantaneous change of feed, and power adjustment for the horizontal and vertical movements of the cross-rail.

No wrench is required to shorten or lengthen the stroke.

Its accuracy and cutting power are beyond the ability of high-speed steel.

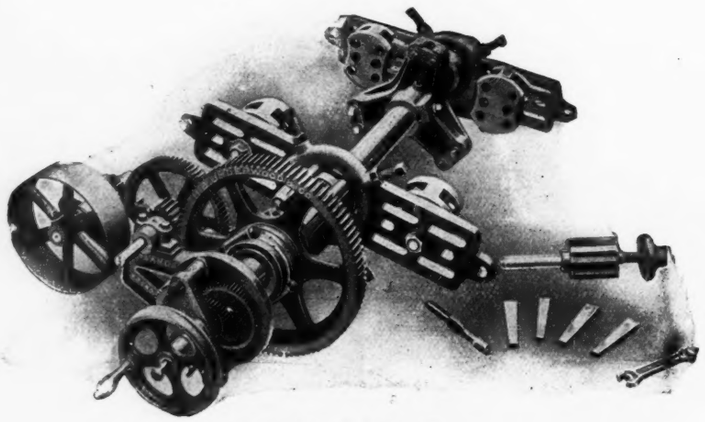
The machine can be equipped with special attachments, designed for the completion, at one setting, of locomotive driving box brasses, whereby they are ready to press into the box direct from the machine; also special Rod Brass attachment designed for the machining of the brass complete for rod strap fits, at one setting.

It can be furnished electrically driven or belt driven, as desired.

When you read this, just write for photographs and descriptive matter.

Morton Manufacturing Company
MUSKEGON HEIGHTS, MICH.

THERE could hardly be a better time to look things over and make necessary changes and repairs than right now—and there isn't a better line of tools for this class of work than the



Portable Boring Bar.

For general boring. Fixtures for boring in any position or in cramped places. Made in a variety of sizes. Powerfully geared. Arranged for hand or power.

Underwood Portable Tools

Invaluable for the railroad, repair or general machine shop. Strong, simple, easily taken from place to place; economical in power, time and labor.

Special tools for special needs. *Write us.*

H. B. UNDERWOOD & CO., 1024 Hamilton Street
(L. B. Flanders Machine Works) **PHILADELPHIA, PA.**

Simple, convenient and efficient geared feed change.

Effective feed tripping mechanism.

Concentrated, convenient operation.

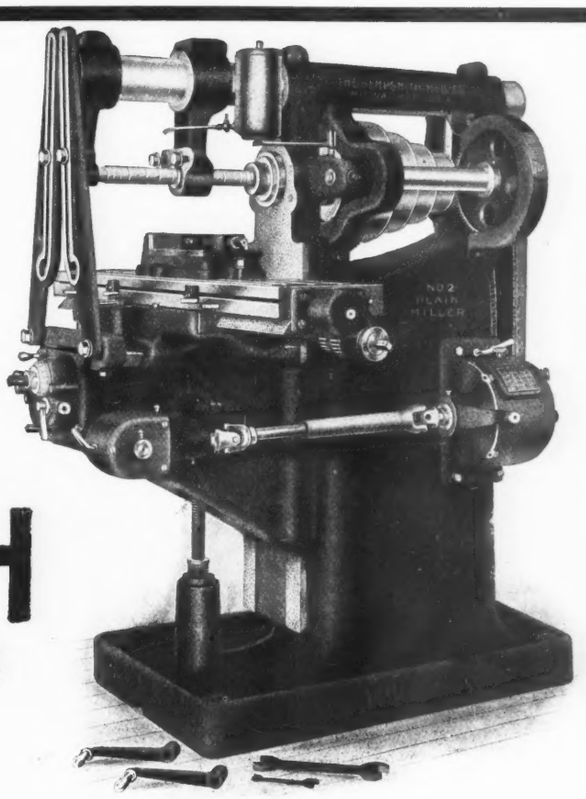
Wide range of automatic feeds.

Guaranteed accuracy of alignments.

Weight—power—stability.

These are all important points, and determine the real work-producing capacity of the machine.

In all of these



KEMPSMITH

MILLING MACHINES

have pronounced advantages, and warrant investigation and comparison.

THE KEMPSMITH MFG. CO., Milwaukee, Wis.

European Agents: Selig Sonnenthal & Co., London, E. C. Agents for Holland and Belgium: R. S. Stokvis & Zonen, Rotterdam.
Canadian Agents: London Machine Tool Co., Ltd., Hamilton, Ont.

LE BLOND

ECONOMICAL MILLING
LeBlond No. 3 Heavy Duty Miller

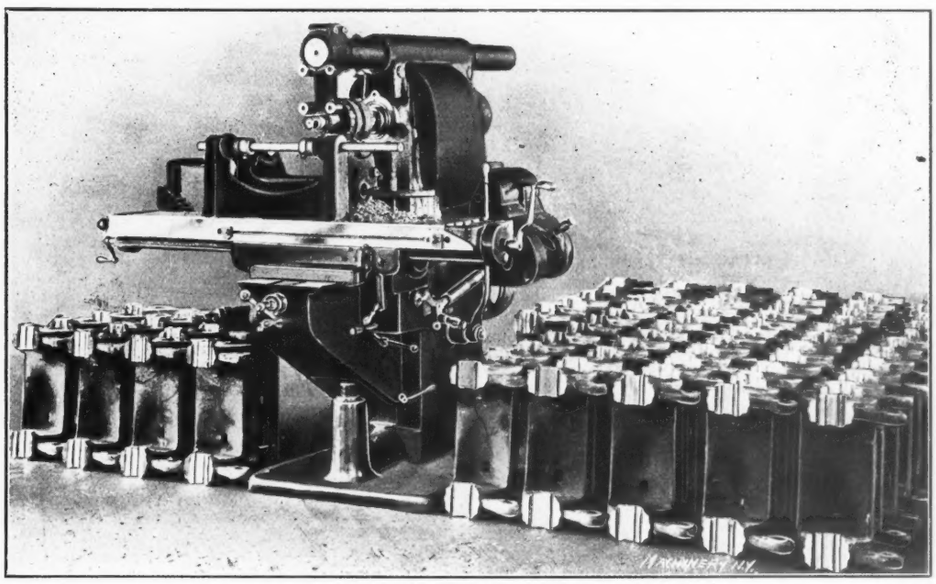
Machining Cap Seats in 14" Lathe Heads.

We find it profitable to mill all our heads to 24" swing. Heads are held in fixture and milled in correct relation to back gear arms. The cut is about 8" long, 4¾" wide and average depth 3-16".

Total Time: 75 Heads in 12 hours.

this is no exceptional time for this miller.

LeBlond tools are noted for ample reserve power in drive and feed.



The R. K. LeBlond Machine Tool Company

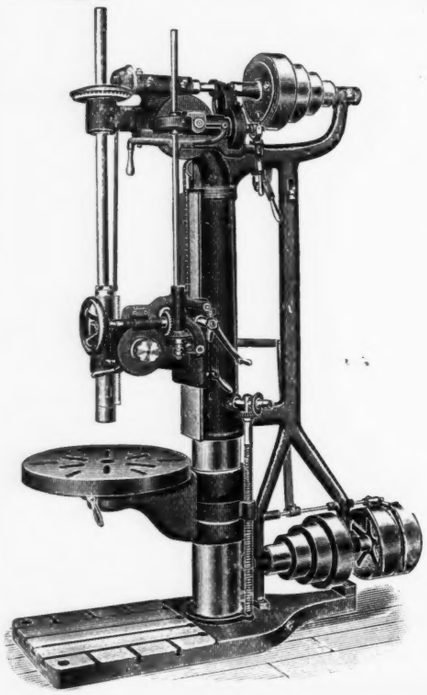
4609 Eastern Avenue, CINCINNATI, OHIO

THE "BARNES"

Positive Feed Drills

8-inch to 50-inch Swing

CONSIDER THESE ADVANTAGES:



1st. Absolutely positive action.
2d. Eight (8) changes of feed.
3d. No belts to throw off or on.
4th. Feed changes can be made while machine is running.
5th. Capacity of drill increased 15 to 25 per cent.
6th. Adapted for use of high-speed cutting steels.

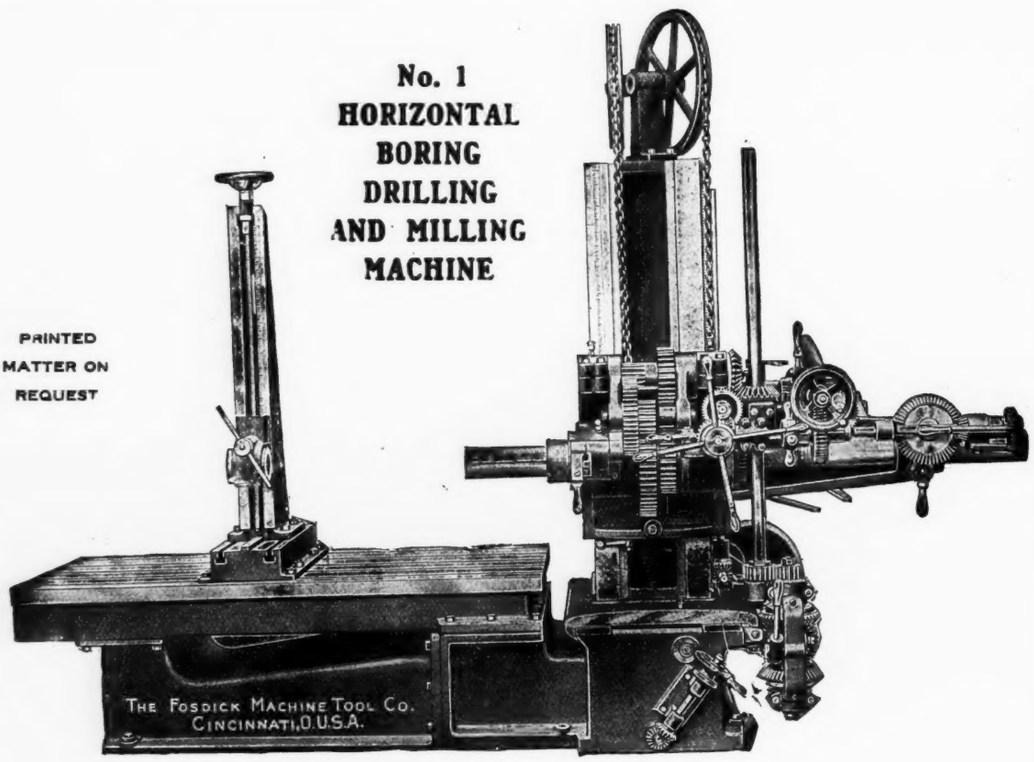
Send for Drill Catalogue.

W. F. & John Barnes Co.
231 Ruby Street, Rockford, Illinois

FOSDICK

No. 1 HORIZONTAL BORING DRILLING AND MILLING MACHINE

PRINTED MATTER ON REQUEST



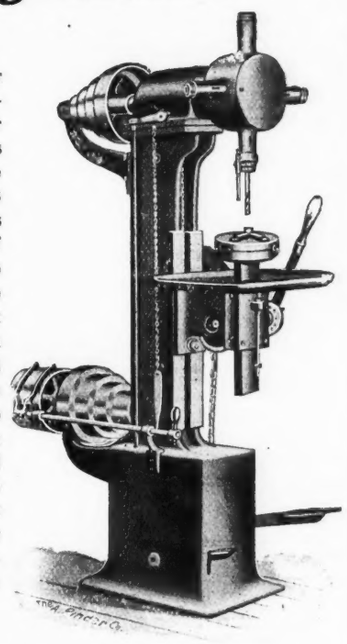
Style A

THE FOSDICK MACHINE TOOL CO., Cincinnati, O., U.S.A.

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, E. C. R. S. Stokvis & Zonen, Rotterdam, Holland. Fenwick Freres & Co., Paris, France. Ludw. Loewe & Co., Berlin, Germany. Adolfo B. Horn, Havana, Cuba. Bevan & Edwards Propty. Ltd., Melbourne, Australia.

Quint's Vertical Turret Chucking Machine

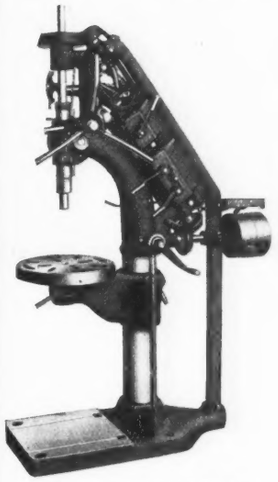
A tool designed for light work and differing from all other chucking machines in the fact that the **cutting tool rotates** —not the work—thus obviating waste of time in stopping the machine to change the work. The chuck is balanced so when the feed is released the work drops with a quick return; a hole through the chuck and stand allows all chips to fall out of the way, leaving the work clear. Built with four or more spindles, positively driven with steel gears.



Write for details and price.

A. E. QUINT, Hartford, Conn.

Our New 20-inch Drill has Geared Speeds and Positive Feeds



Showing Back Geared Style.

Mr. B. F. Barnes.

All changes of speeds and feeds are made instantly without stopping the Drill, and the operator doesn't have to move from his place in front of the machine.

This Drill has the capacity in power of the common 24″ belt driven drill.

Meets requirements of modern shop practice in the use of High Speed Tools.

Descriptive catalogue tells more and it awaits your command.

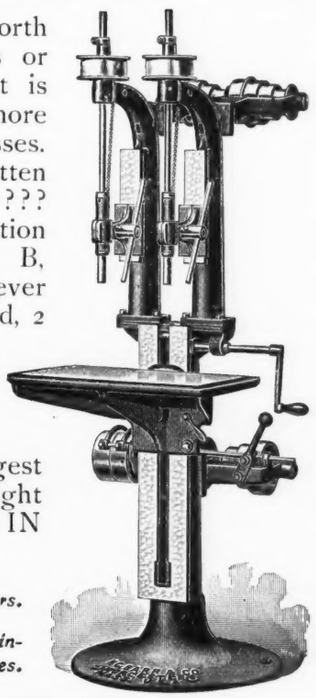
BARNES DRILL CO., Inc. 1907

602 South Main St., ROCKFORD, ILL., U. S. A.

The Drills that Barr Builds

WHICH is worth MOST, Promises or Performances? It is easy to claim more than one possesses. Have you been bitten by the microbe?????? Style A, (illustration 2-spindle), styles B, C, D, E, F, G, lever feed or power feed, 2 to 6-spindles, drill No. 60 to ¾″ holes and POWER TO SPARE.

THIS is the largest and best line of light Drilling Machines IN THE WORLD.



Write for special circulars.

Barr's line of Drills includes 60 styles and sizes.

H. G. BARR, Worcester, Mass.

AGENTS:—De Fries & Co., Dusseldorf, Germany and Milan, Italy.

There's a Place for this Drill in your Shop

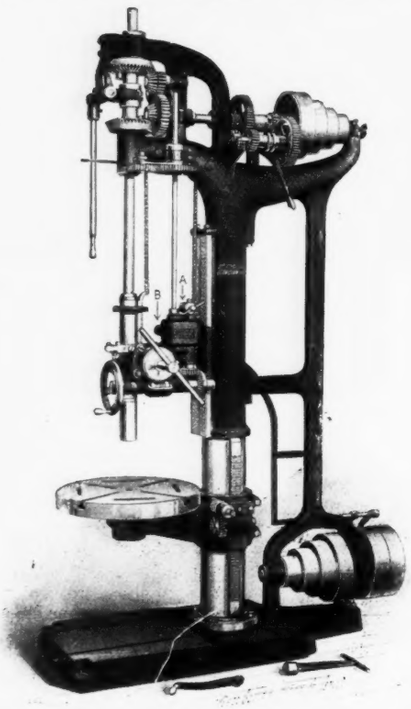
The design is new. All improvements incorporated. Drills to the center of a 25-inch circle and is quick and accurate in operation.

We shall be glad to send you a special circular of this 25-inch Back Gear Power Feed Drill if you will write us.

SUPERIOR MACHINE TOOL CO.

Kokomo, Indiana

THE CINCINNATI



WE GUARANTEE

Our Upright Drilling and Milling Machines to be the Greatest Work Producers Ever Put on the Market

A few of the features that make the above possible are—unusually heavy, strong base, table and table arm; ball bearing, high carbon spindle; large, powerful back gearing; bevel gears planed theoretically correct; steel cable chain of improved design, for counterbalancing head; patent positive geared feed, gear driven from spindle through a quick change feed box containing steel gears, through which 6 feeds are instantly obtained with utmost convenience by operator.

Before you buy, investigate the "Cincinnati." Catalog?

Cincinnati Machine Tool Co.

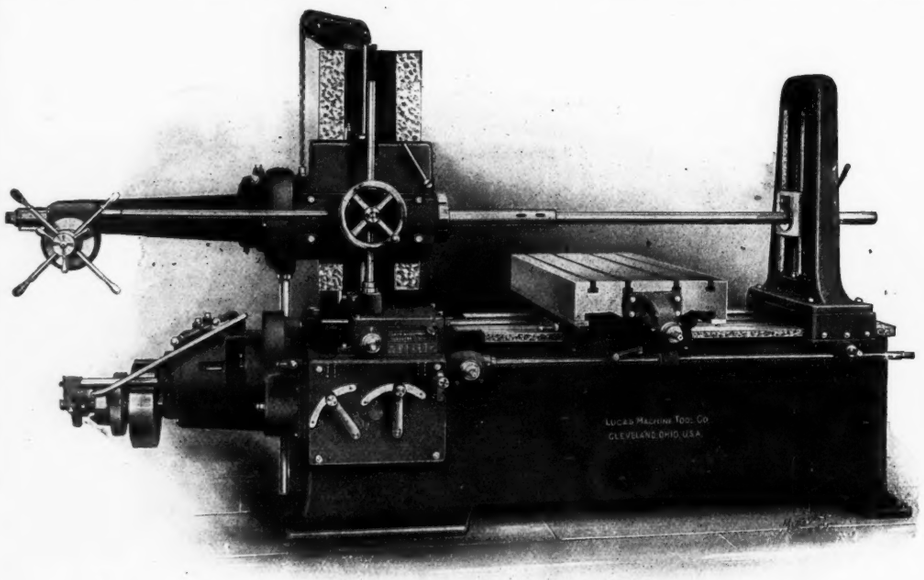
Originators, not copyists, of the Modern Upright Drilling and Tapping Machines.

Western Ave., and Frank St., Cincinnati, O., U. S. A.

FOREIGN AGENTS: Alfred H. Schutte, Cologne, Paris, Brussels, Liege, Milan, Turin, Genoa, Barcelona and Bilbao. Schuchardt & Schutte, Berlin, Stockholm, St. Petersburg and Vienna. R. S. Stokvis & Zonen, Rotterdam, Holland and the Dutch East Indies. Buck & Hickman, London, Great Britain. Andrews & George, Yokohama. Thomas McPherson & Son, Melbourne, Australia. A B. Horn, Havana, Cuba.

A WISE MAN AND HIS MONEY are SOON PARTED after he sees a

LUCAS (Now and always of CLEVELAND) "PRECISION" BORING, DRILLING AND MILLING MACHINE

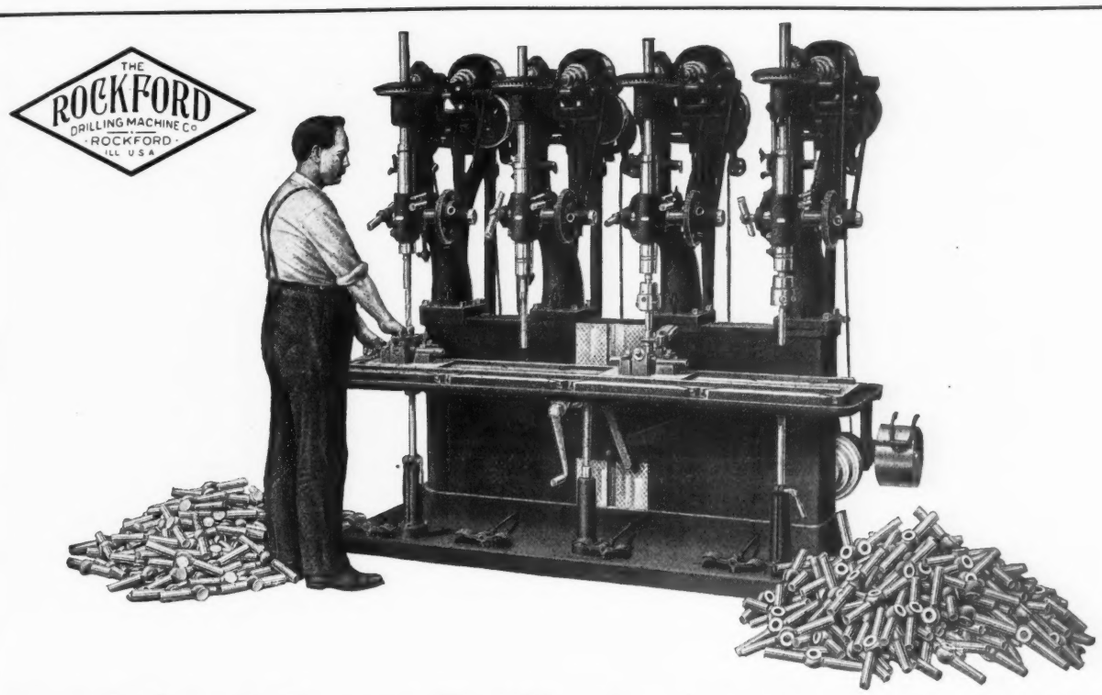


Because he knows it will

MAKE MORE MONEY FOR HIM

LUCAS MACHINE TOOL CO., Cleveland, Ohio, U. S. A.

European Agents: C. W. Burton, Griffiths & Co., London. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona, Schuchardt & Schutte, Berlin, Vienna, Stockholm, St Petersburg, Copenhagen, Budapest.



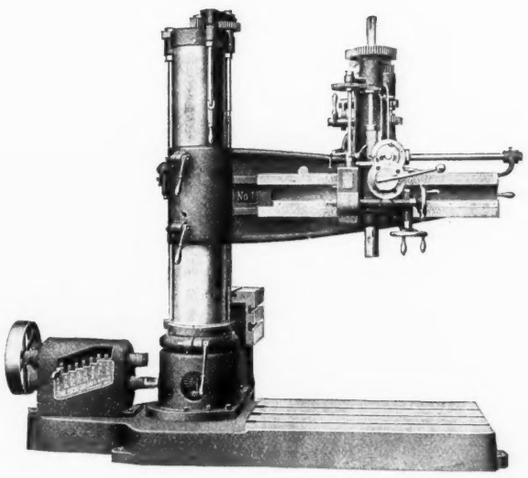
Rockford Gang Drills for Duplicate Drilling

The time and money savers of the busy shop. Rapid in operation, economical of power, equipped with every convenient attachment.

Send for Catalogue of our Line of Drilling Machines.

The Rockford Drilling Machine Company, Rockford, Illinois, U. S. A.

The Feeds on this tool are eight in number and range from .007" to .064 per rev.



The back-gears are located on the head and give, with a single lever, *three* changes of speed.

The speed-box furnishes *eight* changes of speed, each of which is positive and instantly available.

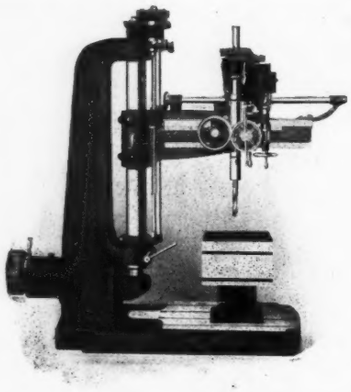
The dial depth-gauge enables the operator to read all depths from zero, thereby dispensing with scale and caliper.

The Bickford Drill & Tool Company

Cincinnati, Ohio, U. S. A.

FOREIGN AGENTS—Alfred H. Schutte, Cologne, Paris, Brussels, Liege, Milan, Bilbao, Barcelona and New York. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg, Copenhagen, Budapest and New York. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Andrews & George, Yokohama, Japan. H. W. Petrie, Toronto and Montreal.

No. 5. Series I-2.



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STIFF, POWERFUL, UP-TO-DATE TOOLS THAT WILL HANDLE THE HEAVIEST CLASSES OF DRILLING

With the housing and base cast in one piece there is no lack of strength or rigidity in these drills. Powerfully driven—cone or geared speed box. Four changes of geared feed instantly obtainable. Tapping attachment and back gears located on the head; every convenience for rapid handling. Made in 2½, 3 and 3½ foot sizes. Ask for Catalogue.

THE JOHN B. MORRIS FOUNDRY CO.
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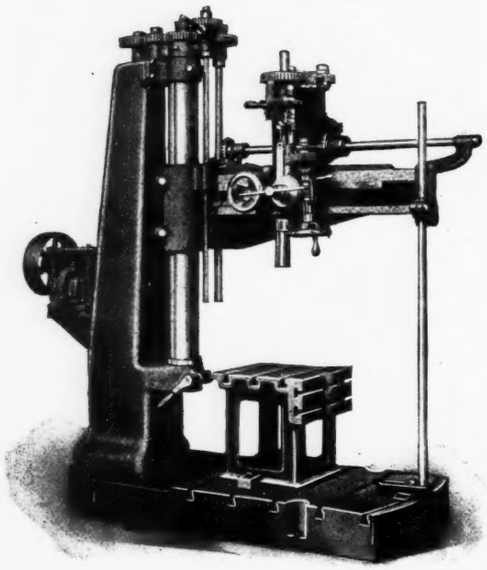
High Class Radial Drills



The **Hilbert Radial Drills** are built to secure the maximum in strength and rigidity, and will handle very heavy work. Driving mechanism is simple but powerful. Eight changes of spindle speed. All speed changes in speed box controlled by one lever. Back gears thrown in or out without stopping the machine. Tapping attachment. Two sizes; ask for circular.

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The Special Facilities for Holding all Kinds of Work

Are important features of this new

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The Regular table can be tilted to any desired angle and is provided with a straight edge for lining up work; one side, also, is widened to give a clamping surface for work that is more easily held at the side of the table. A circular table, fitted with a set of combination centers, and which can be adjusted to any required height, is a further advantage.

Write for detailed description of this wide range and convenient Drill.

Rockford Machine and Shuttle Company
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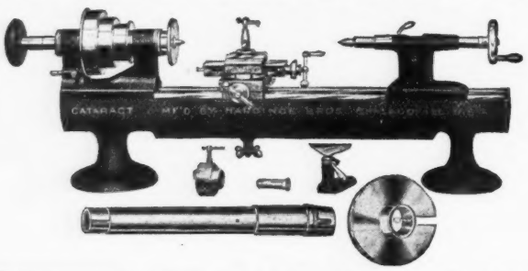

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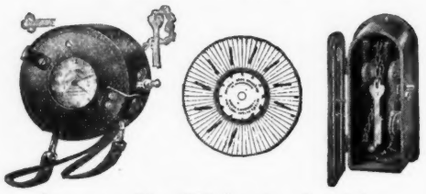

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Known all over the globe **by their merits.** All sizes and styles.
Cone, Speed Variator or Motor Driven.

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REPRESENTATIVES: Manning, Maxwell & Moore, Inc., New York, Philadelphia, Boston, Chicago and Birmingham. Carey Mchy. & Supply Co., Baltimore. Baird Mchy. Co., Pittsburg. Wm. C. Johnson & Sons Mchy. Co., St. Louis. The Strong, Carlisle & Hammond Co., Cleveland. Pacific Tool & Supply Co., San Francisco and Hawaiian Islands. Selig, Sonnenthal & Co., London. C. Schinz, St. Petersburg. G. Koeppen & Co., Moscow. V. Lowener, Copenhagen, Stockholm and Christiania. Van Rietschoten & Houwens, Rotterdam. Wilh. Sonesson & Co., Malmo, Sweden. Stussi & Zweifel, Milan, Italy. Alfred Herbert, Ltd., Paris, Belgium, Spain and Portugal. E. Sonnenthal, Jr., Berlin and Koln. White, Child & Beney, Vienna. Takata & Co., Tokio.

24-inch Upright Drill.

Ask the Price of AURORA DRILLS

It will surprise you to find how moderate is the cost of these up-to-date and efficient machines. They are built in sizes from 14″ to 44″, with back gears, power feed, automatic stop and geared tapping attachment; cover a very widerange of work, have the strength and rapidity for modern manufacturing and can be furnished with belt or motor drive.

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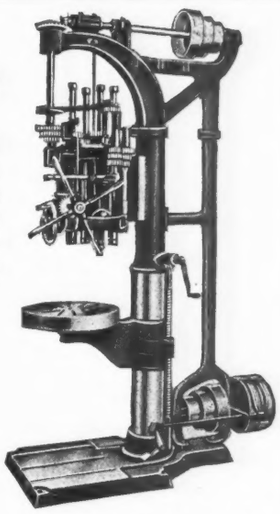
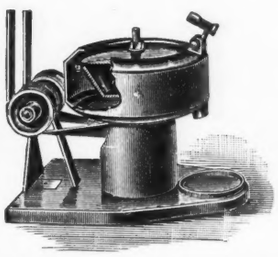
How do you do your Chucking and Jig Work?

Why not try out the **Cylinder-Turret Drill Press** on this class of product? It has no equal for work requiring different size holes in the same alignment. Will drill, ream, bore or tap on duplicate parts at proper feeds and speeds without necessity of changing the tools or work.

30 Days' Trial in your own shop.





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no tool of its class comes nearer perfection than the

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Strength and rigidity to arm and work spindle are assured by the patented stationary column. 16 spindle speeds are instantly obtainable. One lever starts stops and reverses the spindle. Combination positive and friction feed facilitates handling many different kinds of work.

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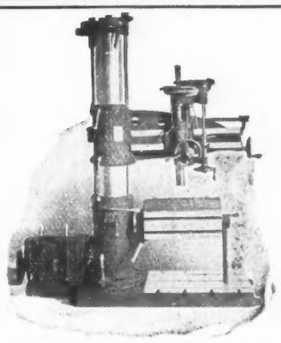

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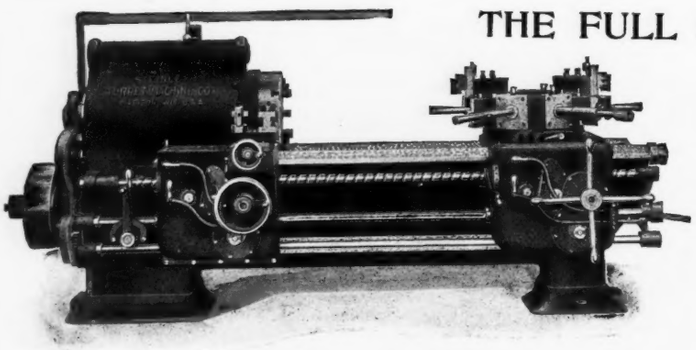

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Modern Construction

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Send us drawings of your work, and we will tell **You** the time required to finish it.

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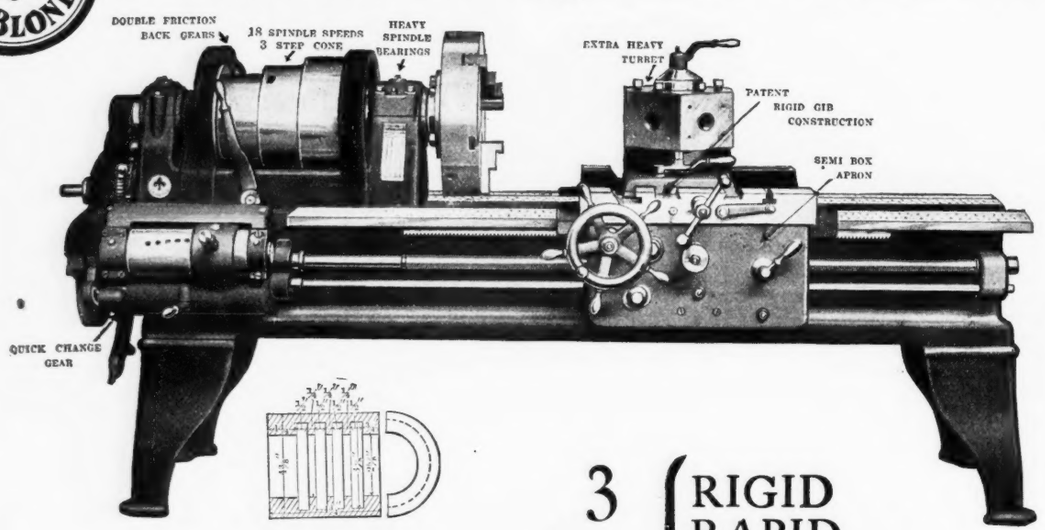
LE BLOND 20" Special Turret Lathe



(PACKING CASING)

Bored, Faced and
Four Slots turned on inside
Time—15 Minutes

3 R's { RIGID, RAPID, RELIABLE

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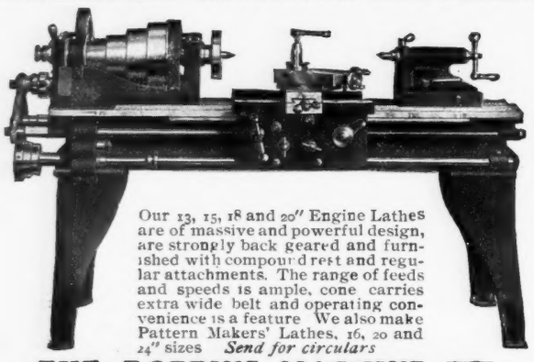

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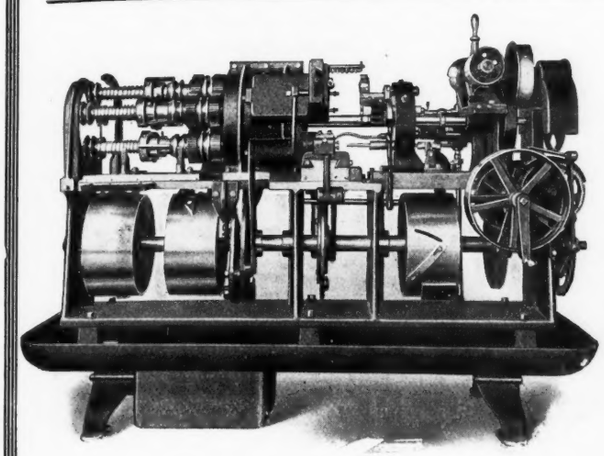
One set of tools working on different bars of stock.



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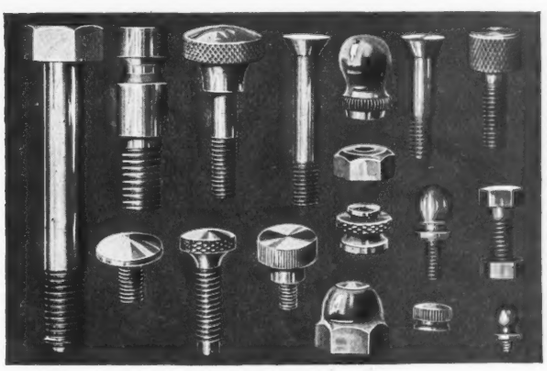
Let us estimate on your work—the figures will surprise you.



Samples of Work.

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FOR EVERY REQUIREMENT — BAR OR CHUCK WORK

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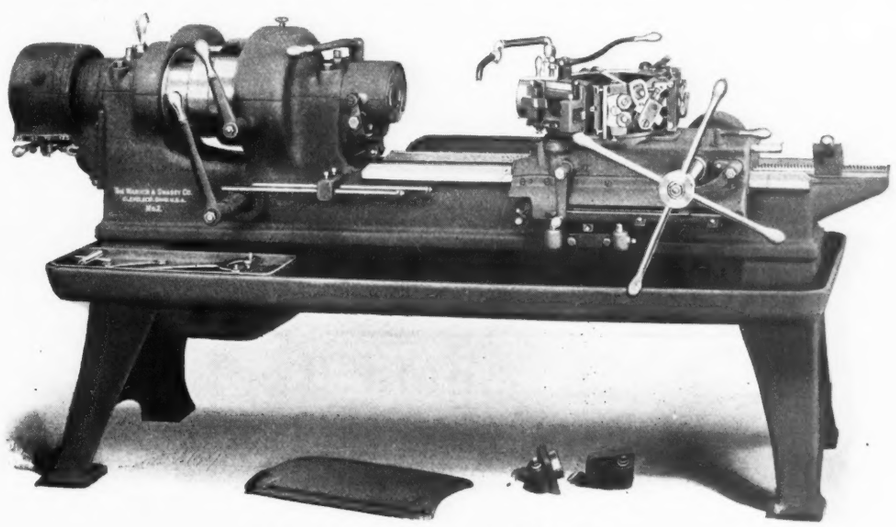

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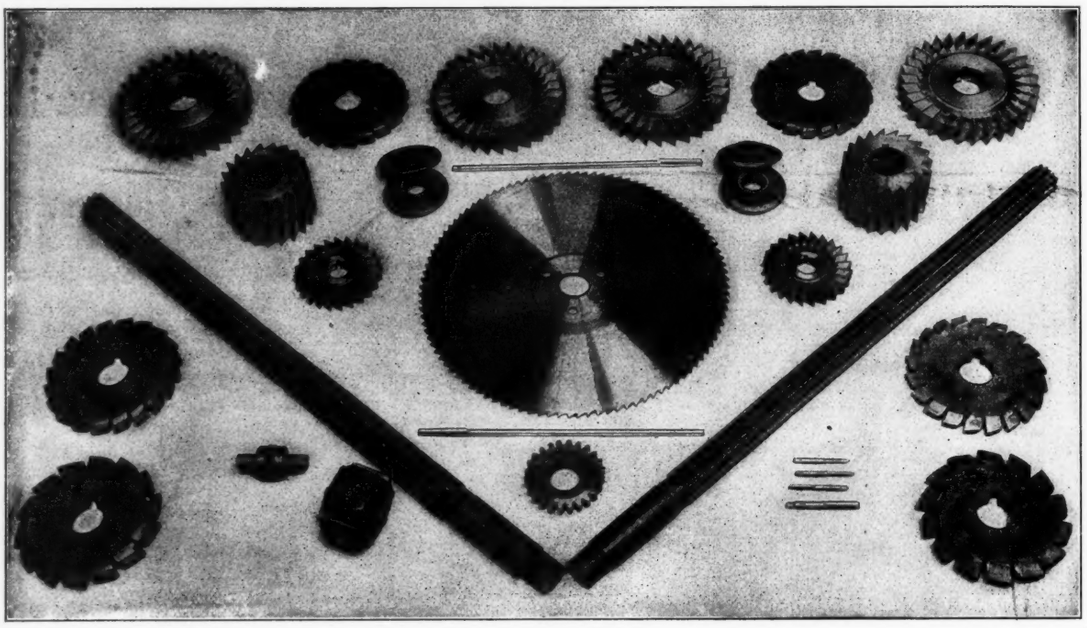
Colonial Number 7

The Tool Steel you use must be hard and it must be tough. Our No. 7 excels any carbon tool steel in both these points.
Hardens at low heat. Will not crack in hardening.
For all dies and cutting tools.

COLONIAL STEEL CO., Pittsburg, Pa.

Tools made from "BLUE CHIP STEEL"



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Champion Tool Holders

Big Head. Big Cutter. Patented Support under the Cutter. Strongest on the market. Save 75% in steel and 65% in grinding.

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ALL AGREEMENTS CONTINGENT UPON STRIKES, ACCIDENTS, OR OTHER CAUSES BEYOND OUR CONTROL

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INTRA STEEL

Between high speed and carbon tool steel.

Remarkable cutting qualities,
Extreme toughness,
Easy to handle,
Absolute uniformity in quality.
Water hardening.

Ask to have your tools made of Intra Steel.

Prices same as carbon tool steel.

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National High Speed and Carbon Drills are the Best

"National" stands for Quality, Durability, Uniformity.

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The Cross Section of the Celfor Drill leaves the maximum space for the escape of chips and gives maximum strength per unit of weight. As a mechanic you know that when the chips can get out easily the power used is small.

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Lumen Bronze
for most bearing requirements.

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for gas engine bearings.

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for places requiring strength.

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to suit any condition.

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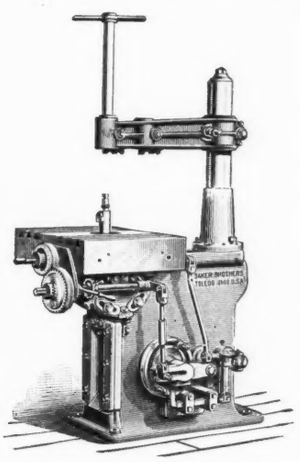
BUFFALO TORONTO

Note the Upper Support For the Cutter Bar



This feature makes it impossible for the cutter to spring away from the work, either sideways or backwards. The cutter-bar always sets true with the table and cannot get out of line. 99% of your work can be done quickly, easily and accurately without moving the column. Write today for a catalog.

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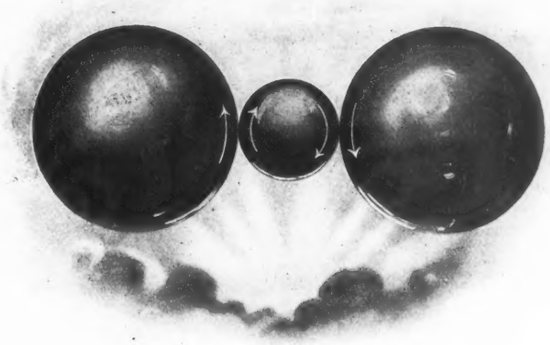
Chapman Double Ball Bearings



No Cross Friction.

Sixteen Thousand Bearings
in actual service today speak well for their efficiency and economy

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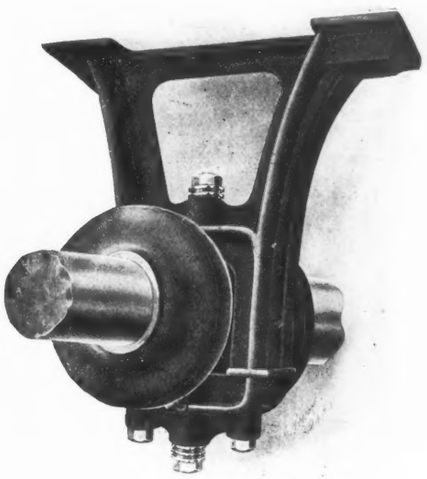

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cut out cross friction, reduce your coal bills, require no lubrication, no attention, are adapted for use wherever friction exists and are especially valuable for light or heavy shafting, for machinery of all kinds and industrial cars.

We shall be glad to estimate on a suitable equipment for your needs.

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is all that is required to equip a

Favorite Reversible Ratchet Wrench

to handle all sizes square or hexagon nuts.

It can be used in cramped places and awkward corners, motion is continuous until the nut is seated or removed, reverse is instantaneous and there is no danger of slipping. This is a wrench built to stand the hard service entailed by railroad or construction work, has nothing about it to get out of order, and saves so much time it is practically indispensable, especially when many nuts of uniform size are to be handled.

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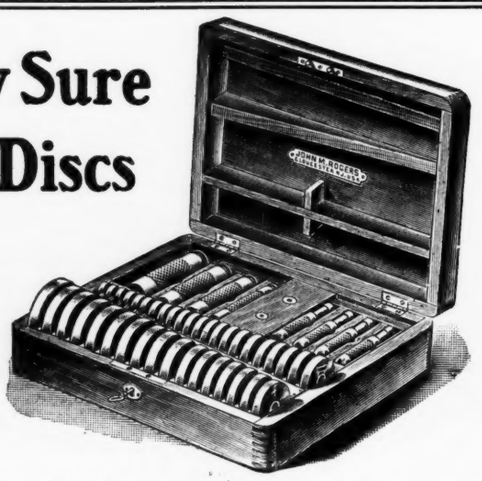

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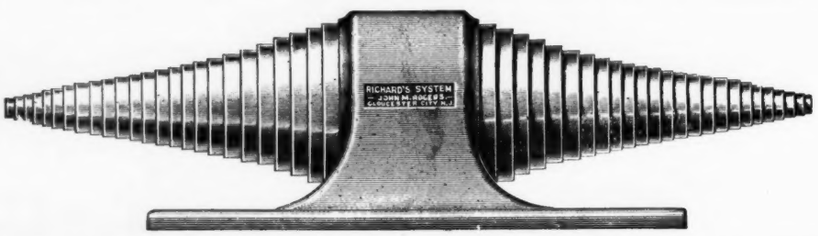

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IMPROVED TOOLS

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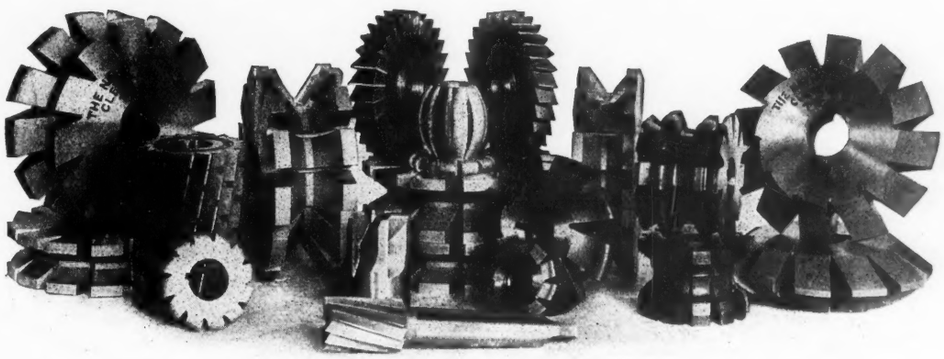

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Prompt delivery is another advantage.

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THE WRENCH WITH A GRIP

A NEW WRENCH. Drop forged of the finest quality Tool Steel. For turning or holding pipe, pipe fittings, bolts, bars, shafts, etc. Simpler, stronger, lighter and more efficient than any other pipe wrench on the market. Designed on new lines. Upper jaw, shank and handle forged in one piece. No rivets, no loose parts to get out of order. The most satisfactory tool of its kind ever made.

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INTRODUCE SCIENCE. ELIMINATE CHANCE.

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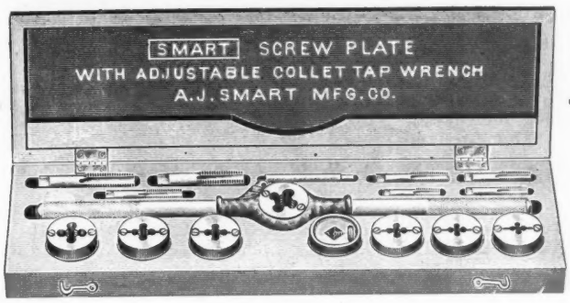
SEATTLE HARDWARE CO., Seattle, Wash.

WRITE US TODAY for prices.
Valuable Catalog for the asking.



SMART

SMART

Have You Heard About the Newest and Best Thing in Screw Plates?

Furnished in all the Standard Threads, including Metric and A. L. A. M. Standard.

Catalog No. 2 fully describes the line. If you haven't our Tap Catalog No. 1 on file, send for both catalogs.

A. J. SMART MANUFACTURING COMPANY, Greenfield, Mass., U. S. A.

New York Office: 86 Warren Street.

Pacific Coast Agents: Wm. P. Horn Co., 138 Front St., San Francisco, Cal.

SLOCOMB MICROMETERS

Made especially to meet the requirements of machine shop work and to stand the hard usage of the shop, these Micrometer Calipers beat the world for durability and maintained accuracy. They are peculiarly designed with an unusually long bearing between the nut and the screw, and a special form of adjustment which permits this bearing to be maintained. Plain tools for every-day, continuous service. 19 sizes, 80 styles. Send for Catalogue No. 11.

J. T. SLOCOMB COMPANY, - PROVIDENCE, R. I.

AGENTS—Chas. Churchill & Co., London, Birmingham, Manchester, Newcastle-on-Tyne, Glasgow. Ludw. Loewe & Co., Berlin. Thos. McPherson & Sons, Melbourne, Australia.

TAP SUPERIORITY

is not an accident—it takes years of study and careful experiment, the best methods and the best material to achieve such success.

Bay State Taps are Superior

because all these attributes are behind them. The temper is perfect, lead correct; they are uniform in size and pitch, unquestionably durable and will tap more holes and do the work more accurately than any other taps.

Catalogue shows a full line of sizes, also a variety of Dies and Screw Plates.

Bay State Tap and Die Company

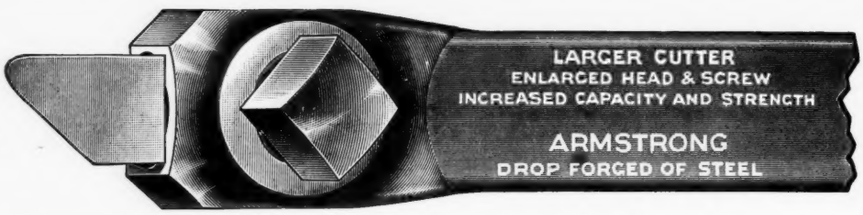
MANSFIELD, MASS.

ARMSTRONG TOOL HOLDERS

THE WORLD'S STANDARD LATHE AND PLANER TOOLS

FIRST COST

is much lower than forged tools.



HERE'S ONE EXAMPLE

⅝" x 1¼" Tool Holder.		⅝" x 1¼" Forged Tool.	
One No. 2 S Straight Shank Tool Holder, equipped with two cutters. List Price	$2.30	2 lbs. Steel at .60	$1.20
Less 25%	.57	Forging, 8 dressings	1 00
		Grinding to shape, 8 times	.60
Net cost	$1.73	Net cost	$2.80

Showing First Cost of Forged Tools is 60% Higher than Armstrong Tool Holders.

THE ARMSTRONG SHORT RATCHET DRILL

Patent Applied for

SHORTEST and STRONGEST RATCHET made

Short Head--Long Feed--Reversible

Made for Morse and Square Taper Shank Drills.

No. 3 Morse Taper.	Length Head, 3¾ inches.	Feed, 2¾ inches.
Square "	" " 2¾ "	" 1½ "

Write for Special Circular.

Drop Forged of Steel

The Armstrong Improved Tool Post

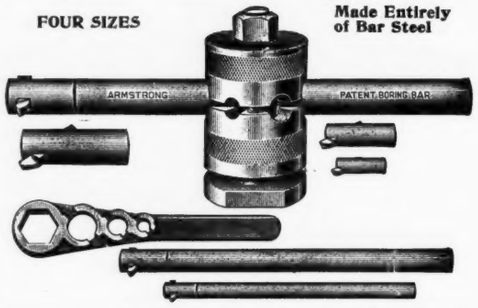
FOUR SIZES

OUR Improved Tool Post combines in itself the strength and holding power of the Strap and Stud Tool Clamp with the convenience of the "open side" and ordinary Set Screw Tool Post. Write for special circular.

3-Bar Boring Tool

FOUR SIZES

Made Entirely of Bar Steel



Increases production and reduces cost of tool maintenance. Cutters cannot jar loose. **High Speeds and Big Feeds** only set them tighter. Write for special circular.

Do you want our New Catalog? It's a Tool Holder Encyclopedia.

Armstrong Bros. Tool Co., "The Tool Holder People" 113 N. Francisco Avenue, CHICAGO, U. S. A.

Imitations are Unsatisfactory ::: Infringements are Unlawful.

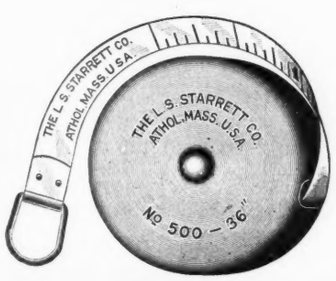
Starrett Steel Measuring Tapes

Insure the closest measurements no matter what the length, can be relied on for accuracy, are easily read, and with ordinary care will last a life-time.

Unswerving, unshrinking, unbreakable—a steel tape is the only satisfactory measure for long lengths. The expansion and contraction of a Starrett Tape one hundred feet long is less than a quarter of an inch, with a temperature variation of thirty degrees.

There is hardly a chance for error in reading a Starrett Tape, because of the special marking. The figures placed at each foot are considerably smaller than the intervening figures denoting inches or fractions of a foot, which is an immense improvement over the usual uniformity of marking.

The Push Button Handle Opener is also a Starrett feature—saves time, temper and trouble; no bother to open the handle, a light pressure on the button on the opposite side does the trick—just as easy with your gloves on as off.



Starrett Steel Tapes range in lengths from 3 feet to 100 feet, have a wide variety of graduations, are put up in steel cases or in leather cases, and with or without push button handle opener, as desired.

Ask for Steel Tape Book showing styles, sizes and prices.

Catalogue 18-D for general line of small tools.

The L. S. Starrett Co.

Athol, Mass.

NEW YORK CHICAGO LONDON

Plane Your Gears by Means of an Accurately Ground Generating Cutter

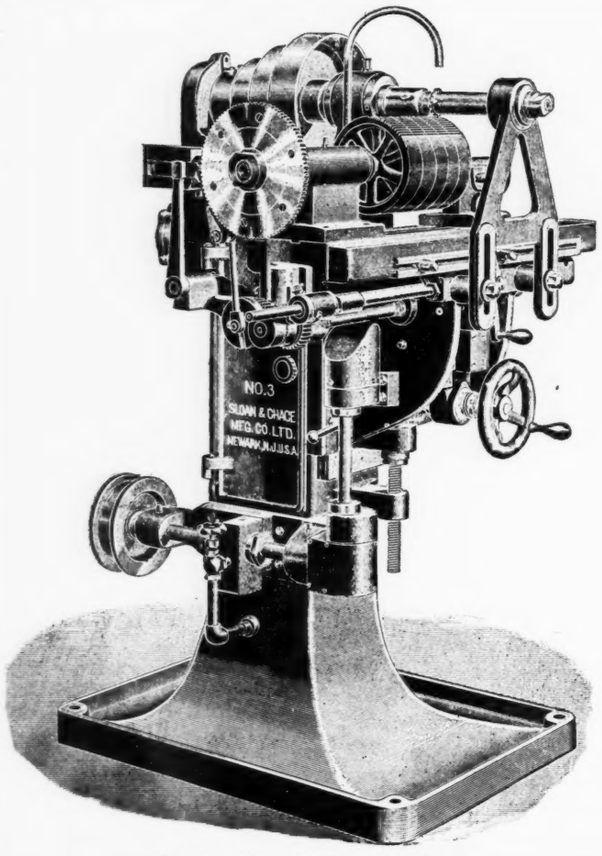
And, other things being equal, you will have the best gears that it is possible to obtain.

Not only does the Gear Shaper produce the right shape of tooth because the cutter is of the generating type, but any mechanical inaccuracies of the cutter such as distortion in hardening, etc., are removed by grinding. Literature?

THE FELLOWS GEAR SHAPER COMPANY

25 Pearl Street, Springfield, Vermont, U. S. A.

FOREIGN AGENTS—Henry Kelley & Co., Manchester, Eng. Ph. Bonvillain and E. Ronceray, Paris, France. M. Koyemann, Dusseldorf, Germany. Adler & Eisenschitz, Milan, Italy. White, Child & Beney, Vienna, Austria. The C. & J. W. Gardner Co., St. Petersburg, Russia.



No. 3 Automatic Gear Cutter.

THE BEST—WHY?

Because it is the most rapid and accurate gear cutting machine on the market.

Proof? Send us samples of your work and we will give you production guarantees.

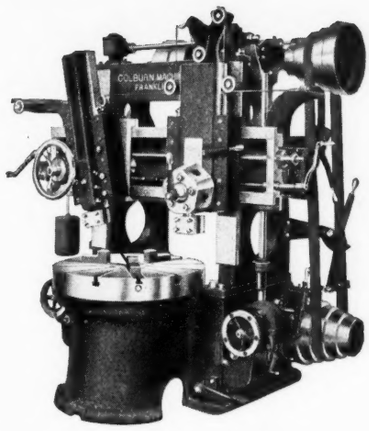
Capacity: Spur Gears from ½″ to 10″ diameter, 10″ face.

Fully automatic.

SLOAN & CHACE MFG. CO., Ltd.

Newark, N. J., U. S. A.

COLBURN
BORING MILLS

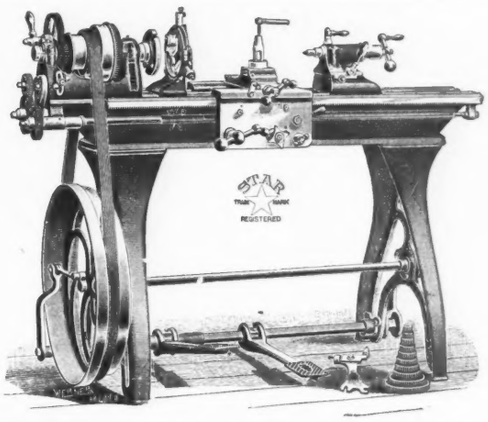


Do you want to run your boring mill department up to c ncert pitch day in and day out instead of getting a 50 or 75% output? Then bear in mind that COLBURN MILLS are built to do the hardest, fastest, stiffest jobs in the shop with accuracy and without jar or effort. They are the simplest and most easily operated mills on the market, correct in design and massive in construction. Write for bulletin of any size you are interested in. Sizes, 30", 34", 42", 48", 53", 60" and 72".

Colburn Machine Tool Co.

Franklin, Pa., U. S. A.

Foreign Agents: Ludw. Loewe & Co., Berlin and London.



"STAR" Foot Power Lathes

are just what the name implies—Star lathes. They are built with the same careful attention to details and from the same high grade materials as the most expensive engine lathe on the market. Their work is as accurate as the production of precision machines, they have every feature for convenient operation and will "make good" in any tool room or light machine shop service.

9 and 11 inch Swing—Sent on Approval.

We guarantee satisfaction or no sale.
Write for catalogue "B."

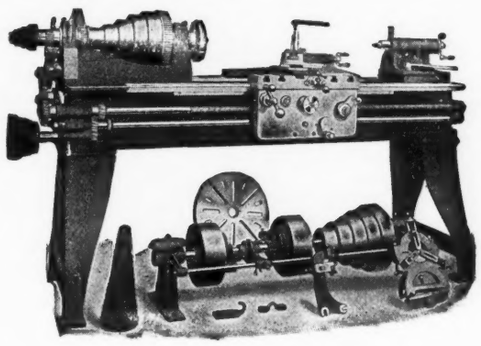
THE SENECA FALLS MFG. CO.,

330 Water Street, Seneca Falls, N. Y., U.S.A.

132A

Von Wyck 15-inch Engine Lathe

With Instantaneous Change Gear Device.



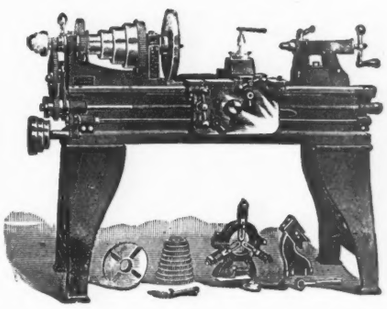
An especially well designed tool for its purpose. The quick change gear device for feeds and screw cutting permits 40 changes without duplication. Massive headstock prevents chatter even under the heaviest cut; every convenience for rapid handling.

Send for full description.

Von Wyck Machine Tool Co.

Cincinnati, Ohio, U. S. A.

Sebastian Lathes



For modern manufacturing our line of 15-inch Engine Lathes fills every requirement

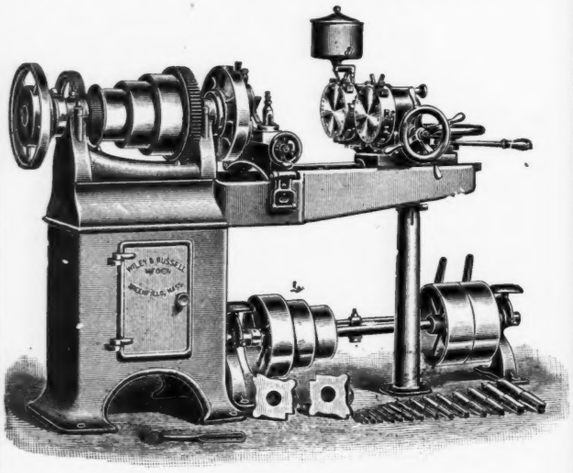
The design is new, all the latest time and labor saving improvements are incorporated and all parts are heavy and substantial. Our aim in putting this Lathe on the market is to furnish a thoroughly practical, high grade tool, suitable for present day work, at a moderate price. Even a hasty examination of its merits will convince you we have struck the bull's-eye.

Circular mailed on request.

Sebastian Lathe Company

129-131 Culvert St., Cincinnati, O.

GREEN RIVER
OPENING-DIE BOLT-CUTTER,
NUT-TAPPER, PIPE-THREADER
AND CUTTING-OFF MACHINE.



No. 55

You can change from one size die to another in less than **one minute** A fine bolt-cutter for Railroad, Mine, Mill and Repair Shops. *Catalog 33-E and prices on application.*

SOLE MAKERS

Wiley & Russell Mfg. Company,

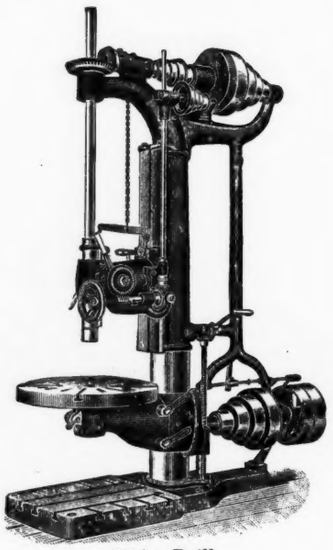
GREENFIELD, MASS., U. S. A.

BRITISH AGENTS: Selig Sonnenthal & Co., 85 Queen Victoria Street, London, E. C

OUR LINE

32-in.
26-in.
24-in.
20-in.
14-in.
14-in. B
13-in. B
Standard Drills

No. 1
No. 2
Friction Drills



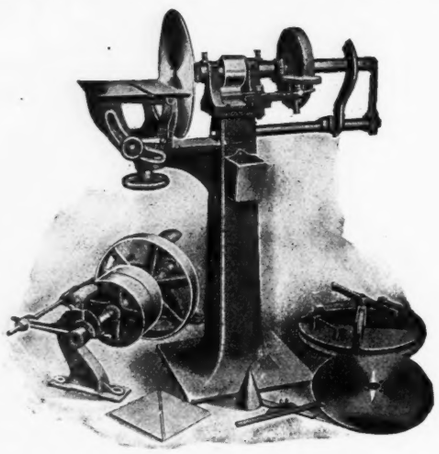
32-in. Drill

Mechanics Machine Co.,

Wyman and Mill Sts.,

ROCKFORD, ILLINOIS, U. S. A.

A Grinder for the Pattern Shop



The "Rowbottom"
Sanding Machine and Tool Grinder

is a time saver and a labor lightener; especially valuable for Pattern Shop and similar lines of work. The disc is designed for flat and angular grinding, and the Sanding Roll takes care of internal work, and irregular and curved pieces in the most efficient manner.

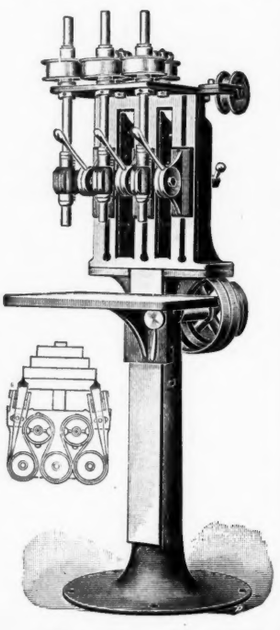
Circulars and full particulars on request.

The Rowbottom Machine Co.

WATERBURY, CONN.

Fit the tool to the service required, and you will get the greatest economy of cost and the largest output.

DWIGHT SLATE DRILLS



meet the demands of present day requirements, for the following reasons:

1st. Construction will bear the most rigid inspection both as to quality of material and workmanship.

2nd. Twenty-five years actual use in the largest shops in the country is a guarantee of their efficiency and durability.

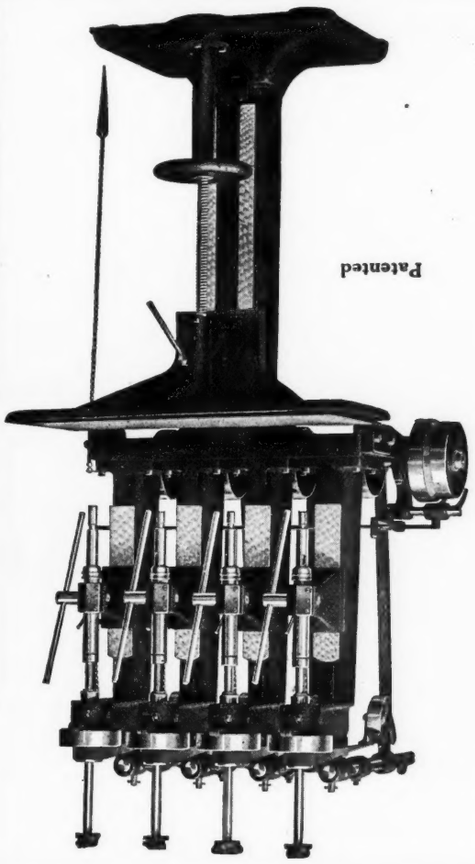
3rd. Moderate in price.

We also manufacture **Automatic Gear Cutters** with capacity for cutting spur, bevel and crown gears ranging from 1/8" to 8" diameter, 4 1/2" face, 12 pitch and finer.

It is worth while to know what we can do for you.

THE DWIGHT SLATE MACHINE CO.

HARTFORD, CONN., U. S. A.



THOUSANDS OF DOLLARS
IN EXTRA PROFITS

Has been the result of the re-equipment of the drilling departments of some of our large manufacturers with

Henry & Wright Ball Bearing
Drilling Machines.

200 to 400 per cent. more work produced in a given time, economy in power, least attention needed, and an amazing durability are features of the H. & W. machines that will interest you.

THERE'S A REASON! CATALOGUE?

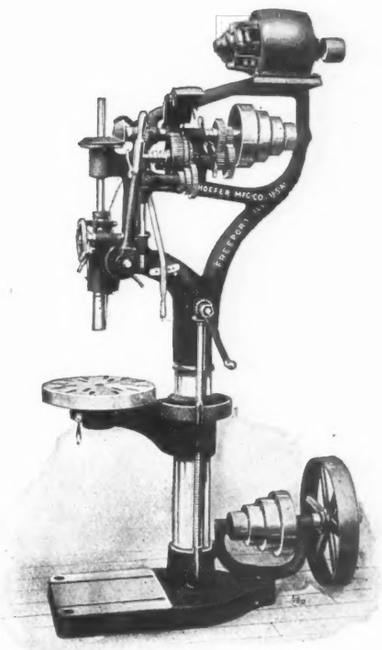
The Henry & Wright Mfg. Co.
HARTFORD, CONN., U. S. A.

Printed upside down by direction of the advertisers.

Reasons why you will find satisfaction in the use of the Hoefer Line of Drills.

Reason No. 1.—In the design of these drills particular attention has been given to the distribution of metal so that there should be no overweighted parts or no weak castings. For this reason Hoefer Drills have long stood the severe tests of day in and day out, year in and year out, high speed service.

See next issue for Reason No. 2.
Send for our Catalog.



HOEFER MFG. CO. **Freeport, Ill., U. S. A.**

AGENTS—C. W. Burton, Griffiths & Co., London, England; for Sweden, Axel Christiernsson, Stockholm, Gotenborg and Malmo; for Switzerland, J. Lambercier & Cie., Geneva; for Austria Hungary, Blau & Company, Vienna; for Australia, Bevans & Edwards Propt., Ltd., Melbourne.

More than 150 Different Grinding Operations

Can be performed on the new

Lektro Portable Universal Grinder

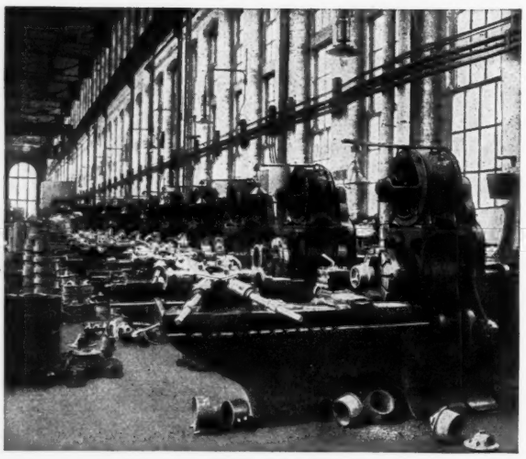
Adapted for cylindrical work, cutter and tool grinding, surface grinding, internal grinding—grinding of every description.

The machine is simple, has few parts, and used in connection with machine tools is full universal. It will grind anything that can be turned over a lathe carriage, can be set at any angle for cup wheel work and is an accurate, time and labor saving tool.

We can offer very attractive figures on a few of these machines—are you in line?

LEKTRO MANUFACTURING CO.
44 Walnut Street, CINCINNATI, OHIO

Efficient Machine Shops Use Western Electric Motors



Battery of Turret Lathes operated by Western Electric Motors.

Because—with individual variable speed motors, the maximum permissable speed is *quickly* attained and readily *maintained* for any and *all* operations and under any condition of operation.

Convenience of Control

enables workmen to work faster and turn out a better grade of work.

Thus you can get the maximum output and increase the productiveness of a plant at the same time decreasing the cost of operation.

Send for Booklet entitled "Increase Your Factory Productiveness" and Bulletin No. 505.

WESTERN ELECTRIC COMPANY

Eastern	Central		Western	Pacific
New York	Chicago	WRITE OUR NEAREST HOUSE	Saint Louis	San Francisco
Philadelphia	Indianapolis		Kansas City	
Boston	Cincinnati		Denver	Los Angeles
Pittsburg	Minneapolis		Dallas	
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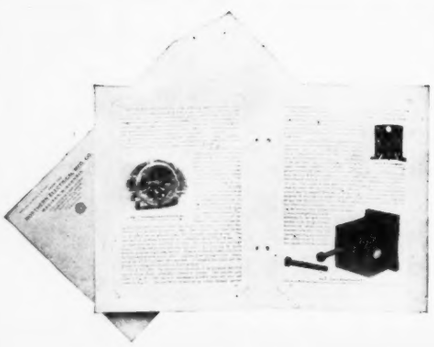
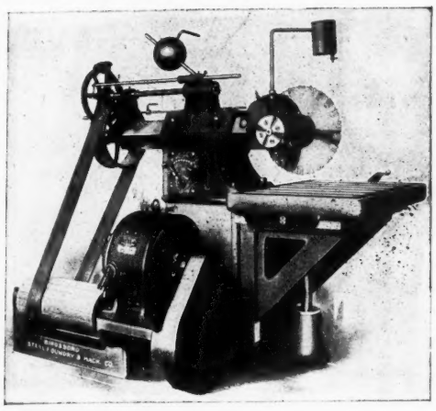
991



MAY WE SEND YOU A COPY?

Bulletin No. 2055 (just issued) is **different**—full of interesting facts and **worth reading.** It describes in detail the Best Engine Driven Generator ever offered—the new Northern **Type L.**

NORTHERN ELECTRICAL MFG. CO.
STANDARD AND SPECIAL ELECTRICAL MACHINERY
Madison, Wisconsin



Westinghouse Motor-Driving Wagner Cold Saw.

The Load Upon a Machine

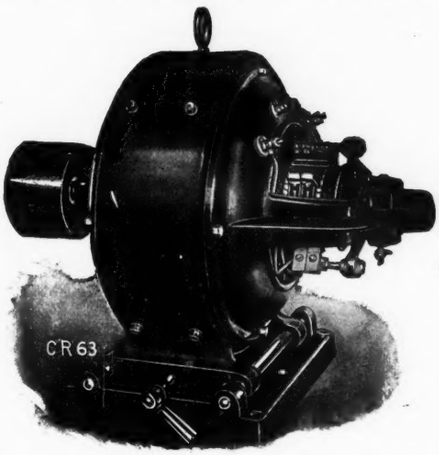
is rarely at a maximum, it usually varies from 40 to 80 per cent according to the class of work. With mechanical drive the shafting and belting must be of a capacity to take care of the maximum load, often as much, or more, than the load on the machine. With direct-connected motors there are no losses when the machine is idle, and when in operation power only is required in proportion to the actual work being done by the machine.

Ask for Booklet 24, "Your Power Problem."

Westinghouse Electric & Mfg. Co.

Sales Offices in all large Cities. Pittsburgh, Pa.

"The Standard" Motors



We are making 20 Standard Motor Frames for all kinds of work—open, gauze enclosed or solid enclosed, vertical shaft, back geared, variable speed, with sliding base, or with broad, flat, planed feet—in short, any kind of Motor you want of 15 H.P. to 1-30 H.P.

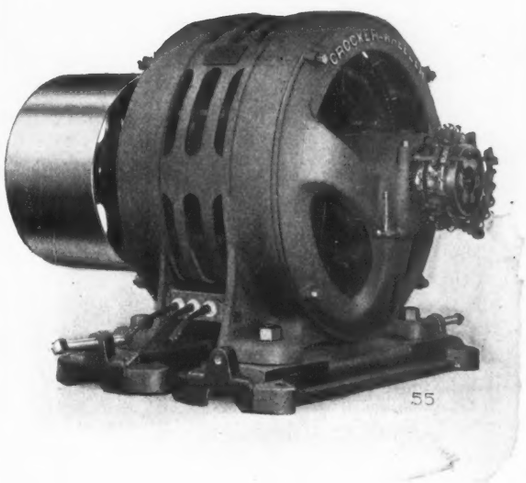
We have made over 20,000 of these standard Motors, and we know the small Motor business as few ever can. "The Standard" Motors are made right. Our engineering advice is yours for the asking; state your case.

The Robbins & Myers Co.,

Main Office and Works: SPRINGFIELD, OHIO.

New York: 145 Chambers St.
Philadelphia: 1109 Arch St.
Dallas, Tex.: W. M. Brooke, Manager
Cleveland: 337 Frankfort Ave., N.W.
Chicago: 48 W. Jackson Blvd.
St. Louis: 11th and Locust Sts.
Los Angeles: 278 So. Main St. and 111 E. Third St.
San Francisco: 319 Howard St.

INDUCTION MOTORS ALSO



THREE-PHASE, CONSTANT SPEED MOTOR.

Perhaps you are not so familiar with **C-W** induction motors as with **C-W** direct current motors.

They are in the same class and deserve your acquaintance.

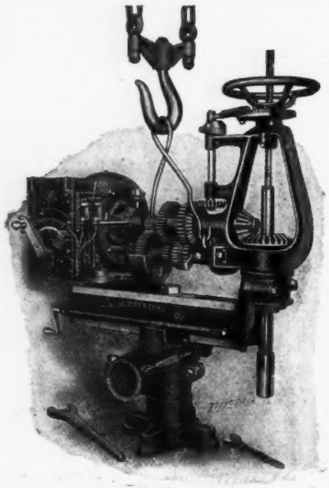
May we send you Bulletin 105 R?

CROCKER-WHEELER COMPANY

Direct and Alternating Current Machinery

AMPERE, N. J.

"Dallett" Motor-Driven Portable Drills

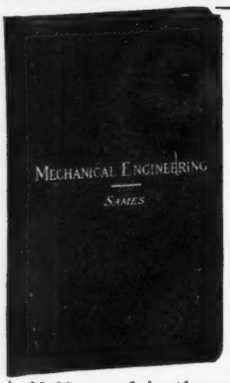


For Drilling in Every Position; a Portable, Standard and Radial Drill in one.

THREE SIZES:
No. 1—Weight 225 lbs.
No. 4—Weight 720 lbs.
No. 5—Weight 1300 lbs

Write for Bulletins.

Thos. H. Dallett Co.
23d and York Sts., PHILADELPHIA, PA.



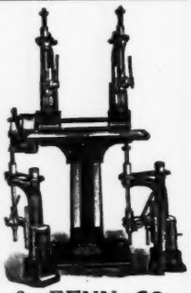
This Book ought to be in the Drafting Room

of every machine shop in the country. It *is* in many of the most progressive ones. You cannot afford to let the expenditure of $2.00 stand in the way of supplying your designers with the up-to-date reference matter it contains, which is not otherwise available in book form.

Descriptive folder on request.

C. M. SAMES, JERSEY CITY, N. J.
542 Bramhall Avenue.

Mighty handy for jig work

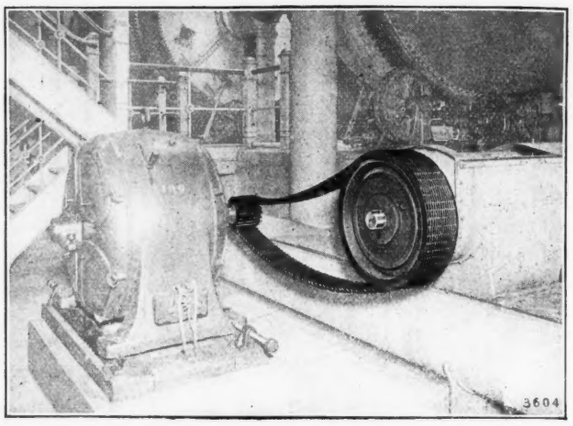


Our Manufacturers' Drill has adjustable top columns, three changes of speed for each spindle entirely independent of each other, lots of power, positive drive, quick changes of speed and plenty more good features which we can't tell about here. Get the catalog.

1 to 6 SPINDLES

THE TAYLOR & FENN CO.
Hartford, Conn., U. S. A.

COMPLETE INDEX TO
Machinery's Data Sheets
SENT ON REQUEST.



RENOLD SILENT CHAIN

is not affected by heat or dampness; its efficiency is always the same—**the highest in power-transmission.**

Write for Booklet "Y" and Bulletins 50-52-57 58.

LINK-BELT COMPANY

Philadelphia Chicago Indianapolis

NEW YORK 299 Broadway. PITTSBURGH 1501 Park Bldg. BOSTON 84 State St. BUFFALO 601 Ellicott Sq. ST. LOUIS Missouri Trust Bldg.
SEATTLE, 440 New York Block.

No. 3 Machine
Drills to 1¼"
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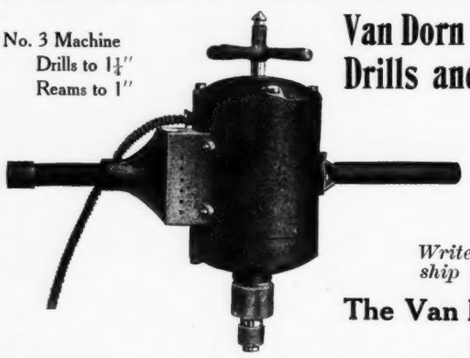

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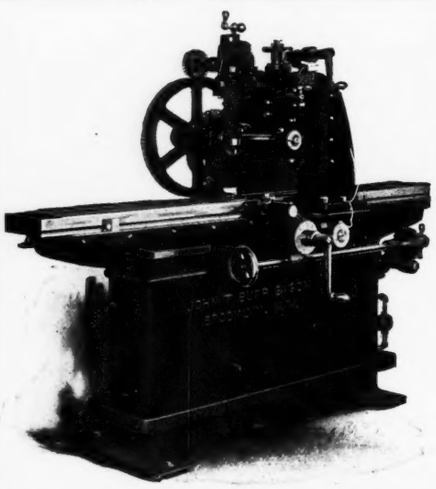

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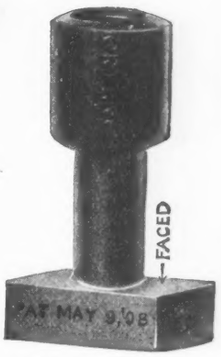

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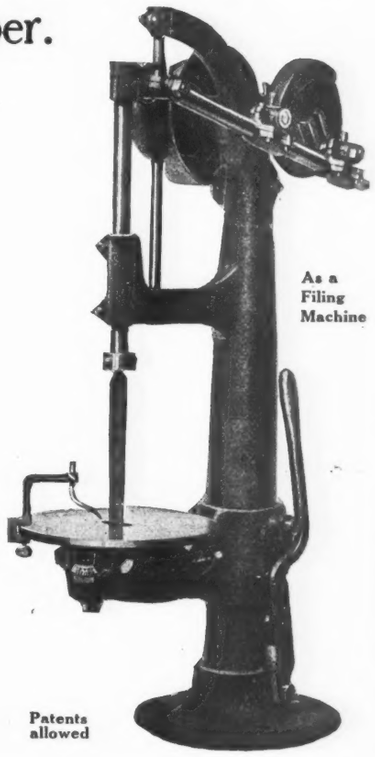

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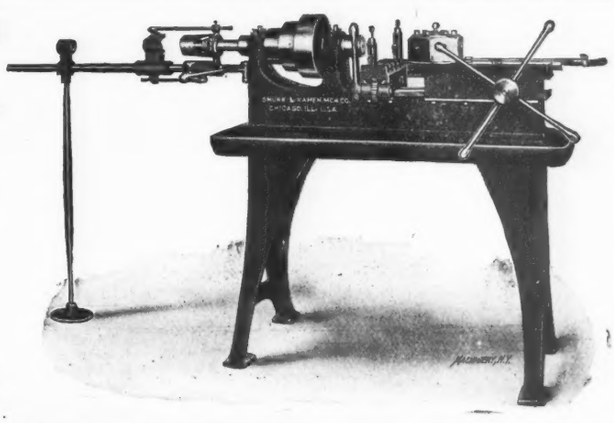

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72"x72"x24' 4 hds, Sellers.
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20" " " "
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96" Swing Special Cylinder Borer.

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½" No. 1 Spencer Single Turret.
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24" x 20' Fitchburg.
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20" x 13' Betts.
20" x 10' Pond.
20" x 8' Betts.
20" x 8' Pond, Rod Feed.
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19" x 6' Pond.
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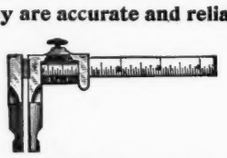

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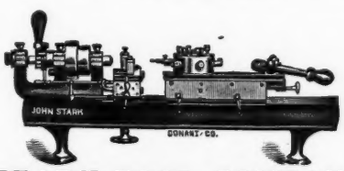

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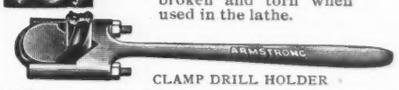

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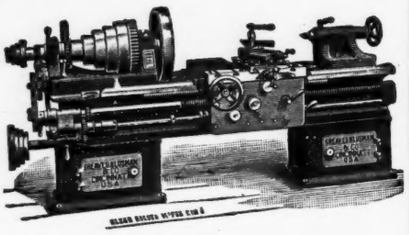

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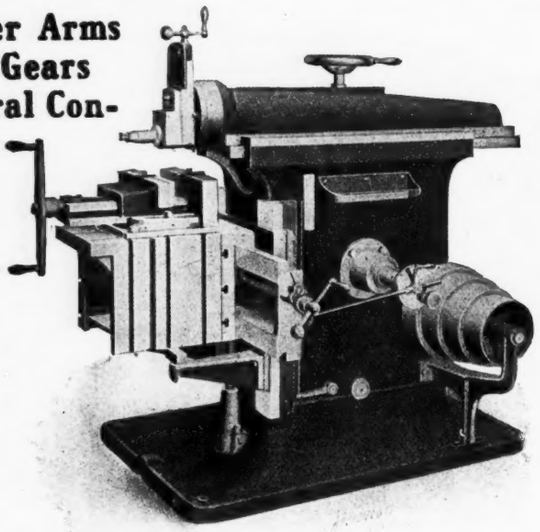

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Catalogue shows full line.

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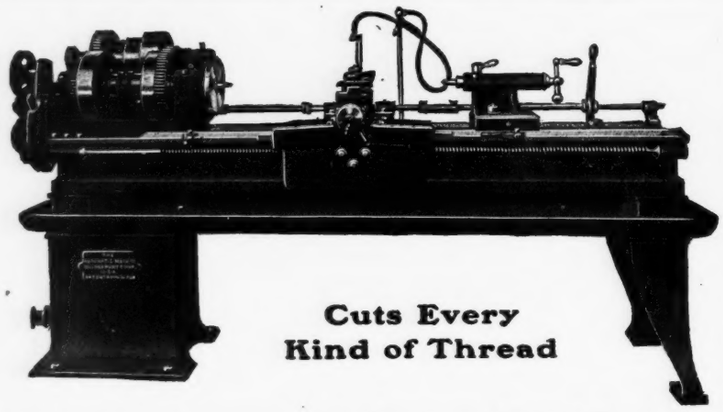
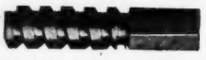


Cuts Every Kind of Thread

The Automatic Threading Lathe

will cut internal, external, right or left hand, straight or taper threads with equal facility. It is entirely automatic in operation and will do from 25 to 100% more threading than the ordinary lathe, besides insuring accurate work. No special tools required. One attendant can operate several machines.

Hoisting Engine Thrust Screw $1\frac{1}{2}$″ x 4″ — $\frac{3}{4}$″ pitch.  made on Automatic Lathe. Time seven minutes.

Send for latest catalogue.

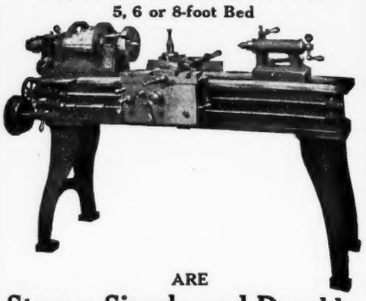
Automatic Machine Co., Bridgeport, Conn.

IMPROVED

"Miami Valley"

13½" ENGINE LATHES

5, 6 or 8-foot Bed



ARE

Strong, Simple and Durable

Head Spindle is of cast crucible steel, ground for No. 4 Morse Taper, using large center and no bushing. Have screw and rod feed, power cross feed. Gears are furnished to cut standard threads from 4 to 64 including 11½ to the inch. Taper Attachment, Draw-in Chuck and Carriage Turret.

We also Manufacture 12 and 14" SENSITIVE DRILLS

Let us send special circular.

The Miami Valley Machine Tool Co.

843 W. Germantown St., DAYTON, O., U.S.A.

WE MANUFACTURE

SHAPERS

EXCLUSIVELY.

12 TO 32 INCH STROKE.

SMITH & MILLS,

Cincinnati, Ohio, U. S. A.

SODA AND POTASH KETTLES

For the Machine Shop, Garage or Repair Shop.

The safest, quickest and most economical method for cleaning new machine parts before case hardening or assembling, or for cleaning machinery parts for all kinds of repair work. Heated by Bunsen, gas or blue flame oil burner. Easily portable, requires no steam traps, piping or drainage. One size—10 gallons capacity. Prompt delivery. Reasonable price.

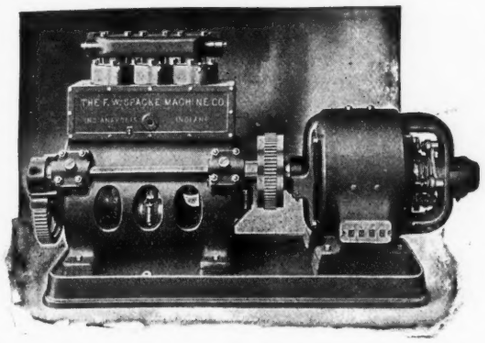
The Gray & Prior Machine Co.

38 Suffield Street, HARTFORD, CONN.

HOISTS,

NEW PATENT WHIP Patent Friction Pulleys. NONE BETTER MANUFACTURED BY

VOLNEY W. MASON & CO., PROVIDENCE, R. I., U. S. A.



AIR COMPRESSORS

Single or Three Cylinder Styles. Belt or Motor Driven

The Triplex and back-geared features of the Spacke Air Compressors make them compact and well-balanced. The variety of sizes is great, ranging in capacity from 1 to 100 cubic feet of free air per minute.

Literature upon request.

THE F. W. SPACKE MACHINE COMPANY, Indianapolis, Ind.

GEAR CUTTING SPROCKET CUTTING

Special department for this division of our business. Estimates furnished.

NO MORE CUSS WORDS IN THE DARK

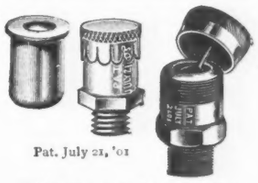
SKUNK UM UN D PL S

IF YOU CAN GET YOUR HAND ON IT YOU CAN PUT THE OIL IN

SEND FOR SAMPLES AND PRICES

European Agents, CHARLES CHURCHILL & CO., London, Eng.

BAY STATE STAMPING CO., WORCESTER, MASS.



Pat. July 21, '01

BENNETT HANDY OILERS

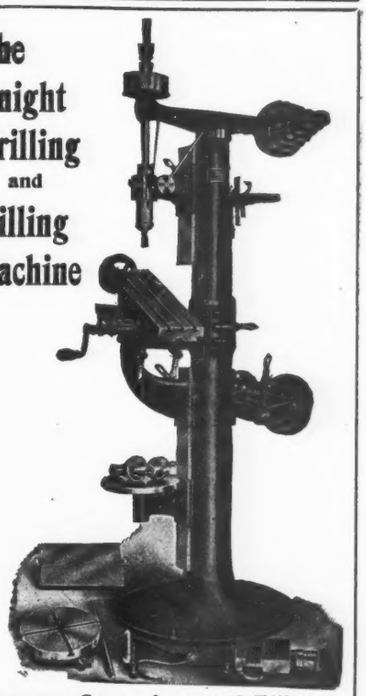
Twenty to Thirty Letters can be Engraved with the Gorton Engraving Machine at a Cost of One Cent.

This is a fact which should interest you and we would like an opportunity to prove that the machine will not only do better work than can be done by hand, but do it in a fraction of the time usually required. Engraving either in relief or sunken, on metal plates, seals, dies, patterns, etc.

Send samples of your requirements, we will then duplicate the same, stating the time required, quoting price with photo on suitable equipment.

GEORGE GORTON MACHINE CO., Racine, Wisconsin

The Knight Drilling and Milling Machine



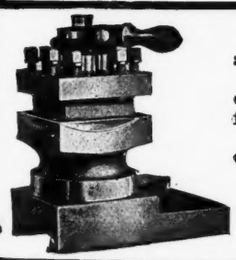
Economy, Convenience and Efficency are the strong points of this machine. Handles a wide range of work and in many operations will save from 20 to 50 per cent. over other methods.

Write for circular showing samples of work.

W. B. Knight Machinery Co.

2019–2025 Lucas Ave., ST. LOUIS, MO.

Turret Tool Block



The advantages of this Carriage Turret will be readily appreciated in all modern, well equipped machine shops.

Attached to an ordinary engine lathe you secure a combination of Engine and Turret Lathe; the only difference being this Turret does not work automatically.

Of course the usual **FAY & SCOTT** excellence enters into the making of it.

Our booklet will tell you all you want to know.

Fay & Scott Dexter, Maine

Precision Disk Grinders

None better at ANY price.

Get our circular.

HOYSRADT & CASE

KINGSTON, N. Y.

Sawyer Tool Mfg. Co.

FITCHBURG, MASS.

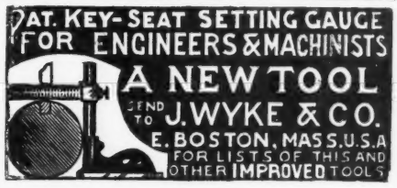
Machinists' Fine Tools.

Steel Rules a Specialty.

Save Money

by having one of our Centering Machines properly located. It has surprised many, why not you? Give it a little thought.

THE PHOENIX MFG. CO. 32 UNION PLACE, HARTFORD, CONN.


PAT. KEY-SEAT SETTING GAUGE
FOR ENGINEERS & MACHINISTS
A NEW TOOL
SEND TO J. WYKE & CO.
E. BOSTON, MASS. U.S.A.
FOR LISTS OF THIS AND OTHER IMPROVED TOOLS

DRILL CHUCKS.

For sale by

De Fries & Co., Dusseldorf, Germany.

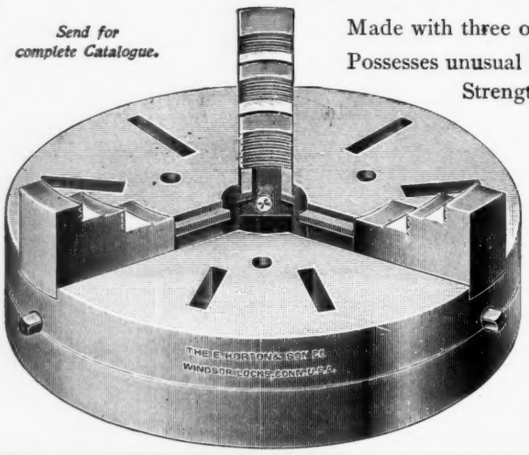
Charles Churchill & Co., Ltd. London, Eng.

Trump Bros. Machine Company, MANUFACTURERS Wilmington, Del., U. S. A.

New Chuck. Heavy Universal, Three Jaws

18 INCH AND UPWARDS.

Send for complete Catalogue.



Made with three or four Jaws.

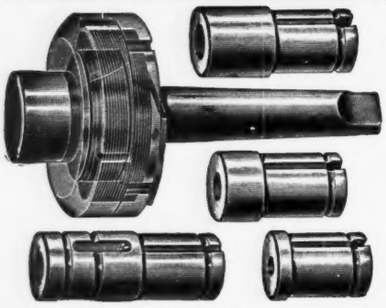
Possesses unusual Power, Rigidity, Weight and Strength.

Built to withstand the severest strains.

Corresponds with Modern Machine Tools.

We are specialists, and make nothing but Chucks.

The E. Horton & Son Company,
Windsor Locks, Conn., U.S.A.



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Safety Drill & Tap Holder

is the only attachment for the purpose that gives universal satisfaction, and is

UNEQUALLED in Efficiency, Convenience, Rapidity, Accuracy and Simplicity.

Nothing to Break or get out of Order. Made in 4 sizes, covering from 0 to 2½ in. diameter.

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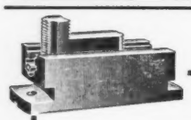
Almond Inclosed Pinion Drill Chuck

With pinion and gear teeth always in perfect mesh there is practically no opportunity for wear.

T. R. ALMOND MFG. CO.
ASHBURNHAM, MASS.
NEW YORK CITY, 40 Murray St.



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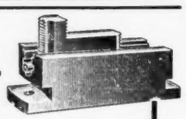
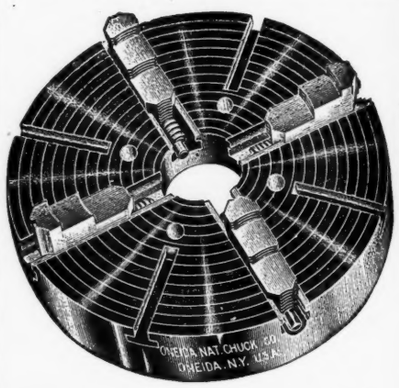


FACE-PLATE JAWS

MADE IN EIGHT STYLES WITH IRON OR STEEL SHELL

UNION MANUFACTURING COMPANY
26 CORTLANDT ST., NEW YORK CITY NEW BRITAIN, CONN., U. S. A.

Oneida National Independent Chuck



National Drill Chuck

Made entirely of Steel. Has no Equal.

Does not get Out of Order.

If you have a dirty job, try it. Money refunded if not satisfactory.

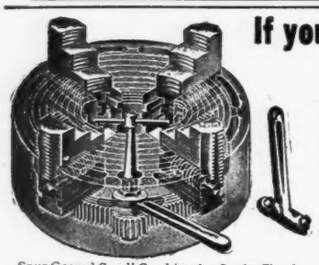
Oneida National Chuck Co.
ONEIDA, N. Y.

The Sweetland Geared Scroll Chuck

with SOLID REVERSIBLE JAWS.

No extra jaws to get mislaid or lost. Two styles of jaws in one, and those always where wanted, in the chuck.

THE HOGGSON & PETTIS MFG. CO.
NEW HAVEN, CONN., U.S.A.



Spur Geared Scroll Combination Lathe Chuck.

If you want the best Lathe or Drill Chucks—buy Wescott's

Little Giant Auxiliary Screw Drill Chucks, Little Giant Double Grip Drill Chucks, Little Giant Improved Drill Chucks, Oneida Drill Chucks, Spur Geared Scroll Combination Lathe Chucks, Scroll Combination Lathe Chucks, Geared Combination Lathe Chucks, Geared Universal Lathe Chucks, Spur Geared Scroll Universal Lathe Chucks, IXL Independent Lathe Chucks, Cutting-off Chucks.

Strongest Grip, Greatest Capacity, Great Durability, Accurate.

WESCOTT CHUCK CO., Oneida, N. Y., U.S.A.
Ask for catalogue in English, French, Spanish or German.

Little Giant Auxiliary Screw Drill Chuck.

Your Screw Machines will do Twice the Work

if they are fitted with the *right* tools, and for rapid and accurate production no screw cutting tools equal the **"GEOMETRIC".** They are the time and labor savers of the busy plant; and samples or drawings of work you are doing would enable us to submit estimate of a suitable outfit of tools for your machines. The style "D" Self Opening and Adjustable Die Head is one of our specialties—adapted for use on hand or automatic screw machines or the turret lathe, will cut any size or kind of thread, right or left hand, cuts close to a shoulder, and opens automatically at the end of the cut. *Circulars if you will advise us.*

The Geometric Tool Company, Westville Station, New Haven, Conn., U. S. A.

FOREIGN AGENTS—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow, Newcastle-on-Tyne. Alfred H. Schutte, Cologne, Brussels. Liege, Paris, Milan, Bilbao. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm, Berlin

SAVES FROM 50 TO 75%

The Tap

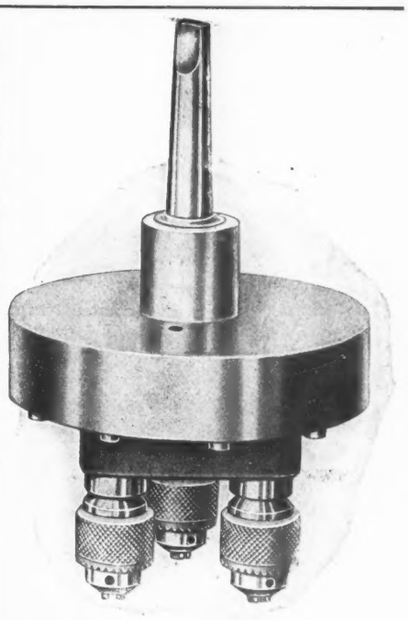
With Reamers Combined,

that will automatically collapse when it has reached the proper depth, and does not require to be reversed, and yet be as *rigid* and *strong* as a solid tap—ought to interest you.

Ask for Catalogue.

Murchey Machine and Tool Company

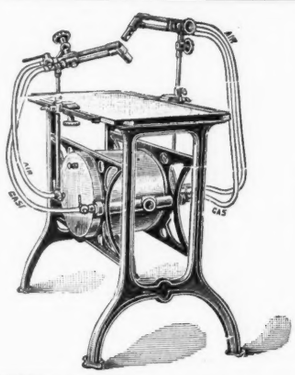
4th and Porter Streets Detroit, Mich.



Drilling Attachment

for two or more drills that will fit your drilling machine without changing your spindle rotation. Will reduce your drilling expense from 25 to 75 percent. Send blue prints or sample for estimate.

FRANCIS REED COMPANY
Worcester, Mass.



ECONOMIZE In Your Brazing Costs

BY USING

"B. D. M. Co's" Brazing Stand

as illustrated. This stand is perfectly adapted to the new process of cast iron brazing; is ready to connect up to your main gas and air supply, and the heat generated will flow the hardest spelter freely, using either natural or manufactured gas. Stand is 31 inches high and table top is 20 x 30 inches. Price complete as illustrated **$35.00.**

Catalogue "B.M." telling all about brazing apparatus will be sent you on request. WRITE TODAY.

Buffalo Dental Manufacturing Co.
BUFFALO, N. Y., U. S. A.

Emery Wheel Dressers and Cutters

Cutters uniformly tempered. Made of the best Tool Steel and not stamped but milled.

GEORGE H. CALDER, - LANCASTER, PA.

The Cushman Chuck Co.

HARTFORD, CONN., U. S. A.

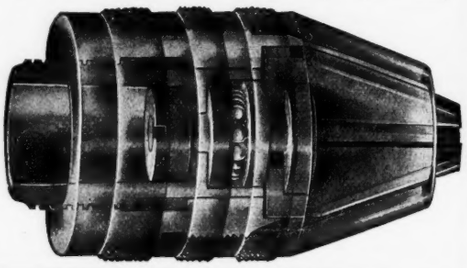
Manufacturers of

Lathe and Drill Chucks

Catalogue Free

The Russell Anti-Friction Drill Chuck

Has the grip of a bull-dog—no slip, no wavering, no give up; is easily adjusted—operated entirely by hand, no key or spanner needed; saves time and drills.



The antifriction bearing is the special feature, overcomes all frictional resistance in tightening. Do you see the advantage? We'll tell you more about it if you will write us. Five sizes.

RUSSELL ANTI-FRICTION DRILL CHUCK CO., Elmira, New York, U. S. A.

A Securely Held Drill

is half the battle You can't do good work or do it quickly unless the drill, reamer—or whatever tool you are using—is held firmly.

The Pratt Chuck

is the ideal drill holder, because its construction makes slipping impossible. It not only holds the tool securely but it holds it without damage to the shank The flattened end of the shank is passed through a little dog floating at the top of the chuck jaws, and which must turn as the chuck turns; the jaws are tightened just enough to keep the drill from falling out—and the shank is kept in good condition.

The simplest, most practical and most reliable Drill Chuck on the market.

Write for the book.

THE PRATT CHUCK CO.

Frankfort, N. Y.

EUROPEAN AGENTS—Selig, Sonnenthal & Co., 85 Queen Victoria Street, London, Eng.

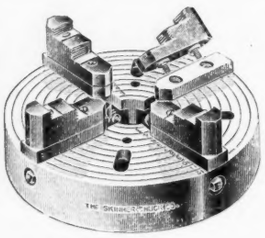
? ? ? CHUCK QUESTIONS ? ? ?

Are they accurate?

Are the Jaws and Adjusting Screws of such grade of steel, properly tempered, to withstand the wear and tear?

Are they so constructed that the operator has to go through only a few convenient motions, in adjusting them?

All **Skinner Chucks** are guaranteed for accuracy, the chuck jaws being ground true in the chuck body after hardening.



Convenience of operation was an important factor is designing each different style.

Write us in regard to your requirements for **Lathe, Drill** or **Planer Chucks,** and we will be pleased to recommend sizes and styles. You want our 1908 Price List at least.

THE SKINNER CHUCK CO.

94 N Stanley St., New Britain, Conn, U. S A.

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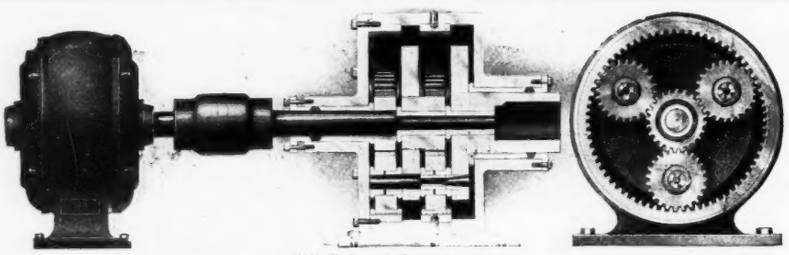


O'Kelly Patent, June 27, 1905.

We use a Universal Coupling to Connect the Motor to the Reduction Gear Shaft, which Obviates the Necessity of Perfect Alignment.

The engraving illustrates a Speed Reducing Transmission for reducing the speed from a motor or driving shaft to any required speed of machine or driven shaft. It will be found efficient, strong and durable, being entirely incased and oil tight. It is absolutely safe and requires practically no attention. All the moving parts run in the same direction and you will note by taking power from three points of the pinions it gives a balanced drive with great emergency strength. The annular or internal gears are made of semi-steel; the idlers are made of steel, bushed with hard steel bushings. The idler pins are steel, case-hardened and keyed to the discs with a hard taper pin which can be quickly removed as shown in the cut. The bearings are bushed with Phosphor bronze. We make this device in a variety of sizes and speed reductions from ⅓ to 50 horse-power, either vertical or horizontal

D. O. JAMES MFG. COMPANY, - - 351-353 West Monroe Street, Chicago

The Jacobs Improved Drill Chuck

With Toothed Sleeve and Key

Chuck No. 3, cut actual size.

Capacity 0 to 17-32".

Patented Sept. 16, 1902.

Chuck No. 2. cut actual size.

Capacity 0 to 21-64".

MADE IN FIVE SIZES

Largest with capacity up to 1" drills.

Chuck No. 1, cut actual size.

Capacity 0 to 13-64".

"The Jacobs Improved Drill Chuck is not only the most convenient, but after two years of service, has proven to be the most durable Drill Chuck we have ever used."

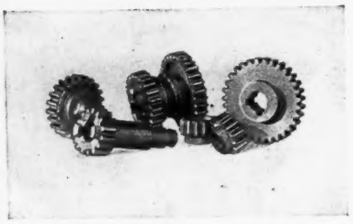
Superintendent of a large Fire Arms Concern.

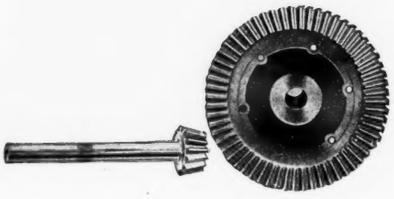
We offer you a chance to economize on your drill work—ask for the book and learn just how.

The Jacobs Manufacturing Company

Hartford, Conn., U. S. A.

ACCURATE CUT GEARS

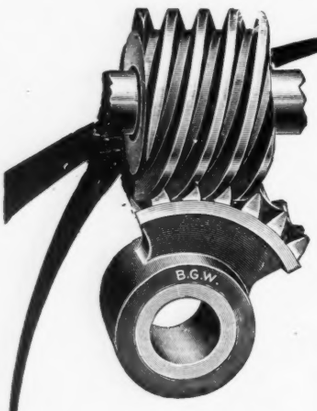




FOR AUTOMOBILES

And other machinery where the highest quality of workmanship is essential. Can furnish every kind of gears and of any material required. We have splendid facilities for turning out high grade work in any quantity and can make prices which will doubtless interest you. Send us your blue prints for estimates.

The New Process Raw Hide Co.
SYRACUSE, NEW YORK



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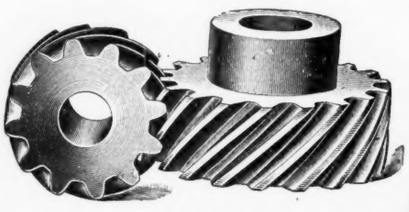
OUR NEW AND COMPLETE LIST OF
STEEL HELICAL AND SPUR GEARS

Stock Gears from 16 pitch to 3 D. P. and from 1″ to 36″ diameter. These gears can be placed side by side increasing the face to double width. Also made in one piece with double face, producing a very quiet running and durable gear. The uniformity in dimensions, high grade of material and superior workmanship put Boston Gears in a class by themselves. Manufacturers in adopting them for their new machines will save time and considerable expense. We make quick deliveries. Our stock gears are made in large quantities and can be sold at reasonable prices. *Write us.*



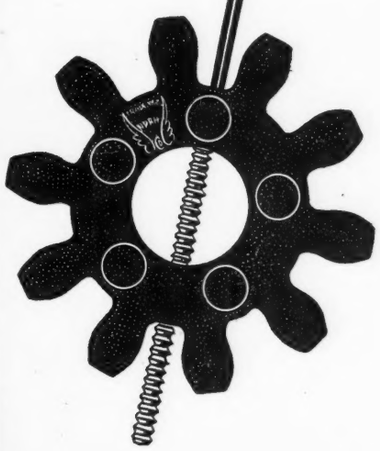
BOSTON GEAR WORKS
NORFOLK DOWNS,
MASS., U.S.A.

A timely hint

Write for Booklet telling all about New Process Raw Hide.

Now, while your shop isn't as busy as it has been, why not overhaul things? Substitute

New Process Noiseless Pinions



for those old grinding metal wheels and secure a quiet shop. They wear like iron, run quietly when meshed with your old iron gears.

The New Process Raw Hide Co.,
Syracuse, N.Y.

ELEC. WORLD

Grant Gear Works

6 Portland St., Boston, Mass.

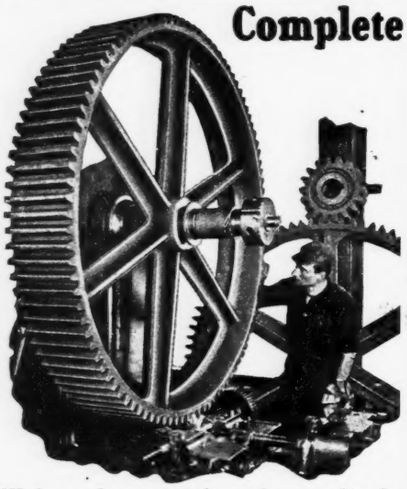
Gear Wheels and Gear Cutting

of every size and kind on hand and to order. Facilities complete.

Grant's Treatise on Gears
One dollar—worth ten.

Grant's Gear Book
Full information. Free.

Our Line of Gears is Complete



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Our catalogue sent to any firm on request. The most valuable book on gearing published.

Foote Bros. Gear & Machine Co.
Successors to James & Foote,
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SMALL GEARS

LIGHT SPROCKETS and CHAINS.
SMALL and MEDIUM SIZED GEARS.
PINION WIRE, RACKS, RATCHETS, ETC.

All kinds, for all purposes. Immediate attention to all inquiries or orders, large or small. Prompt delivery—good work—right prices. This class of work our exclusive specialty.

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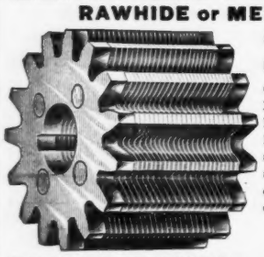
GEARS and PINIONS
RAWHIDE or METAL



Accurate Workmanship, Prompt Delivery

Our "CHICAGO" Native Packer Hide PINIONS and BLANKS, possess a strength and durability of fibre equaled by no others.

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PLANED BEVEL GEARS
For Every Purpose

WM. GANSCHOW
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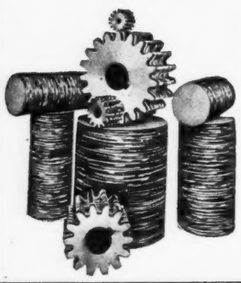

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"Grant's Treatise on Gears" $1.00.

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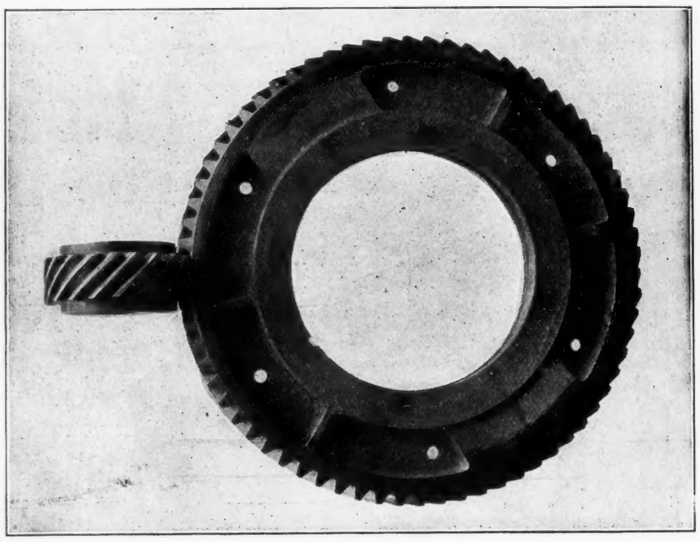
GEO. B. GRANT, Pres and M. E. **PHILADELPHIA**



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are the newest creation in the art of making commercial gears. They drive forward or backwards with equal efficiency and smoothness of rotation.

Write for the Hindley Gear Book.

MORSE, WILLIAMS & CO.
(Department of Otis Elevator Company)
Engineers **PHILADELPHIA, PA.**

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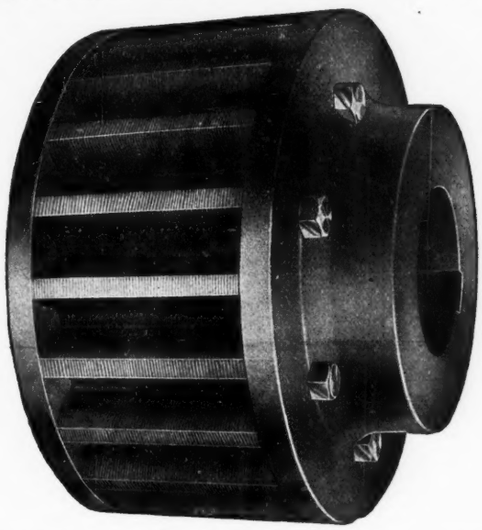

Adapted for light or heavy service—noiseless, efficient, durable—the gears that are replacing metal gears in the best shops in the country.

These pinions mesh perfectly with metal gears and prolong their life; save power, run smoothly and in silence.

Our Blue Book on Gears gives details.

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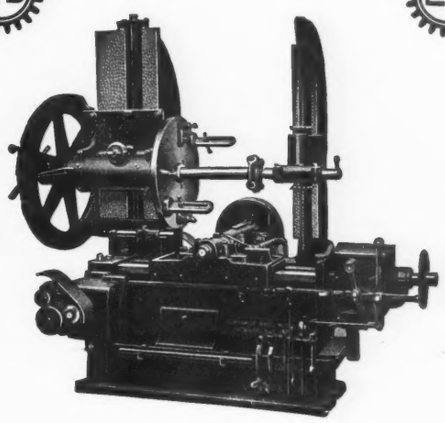

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AUTOMATIC

GEAR CUTTING MACHINES.

THEY CUT ACCURATE GEARS FASTER THAN ANY OTHER MACHINES. IMPROVED DESIGN IS THE REASON.

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BEVEL GEARS Cut Theoretically Correct

Facilities for cutting Spur, Worm, Spiral and Internal Gear Wheels.

Bevel Gear Generators and Special Machines

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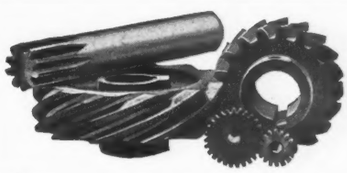

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WE GUARANTEE SATISFACTION.

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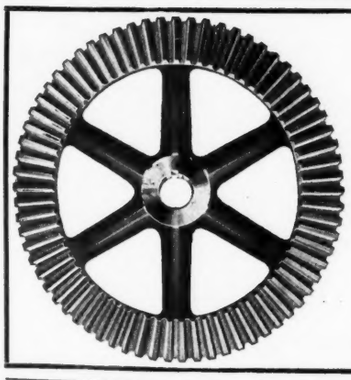

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Teeth planed in our Bevel Gears theoretically correct. Equipped for Gear Cutting and the manufacture of Gears of all kinds. Breakdown jobs handled promptly.

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Jigs and Fixtures, Punches, Dies, general machine work. Fifteen years experience on work of this character. Send blue prints and let me estimate on your work—it's money saved.

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The celebrated **Vandyke Solar Paper for Positive Blue or Black Prints.**

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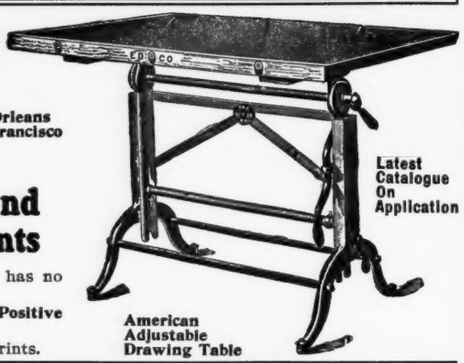

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Latest Catalogue On Application

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MAKERS OF

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Wagenhorst Blue Printers are used by the U. S. Government, by the Carnegie Steel Co., and by hundreds of drafting rooms throughout the country. Why?

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WE MAKE AUTOMATIC PINION and GEAR CUTTING MACHINES

For all classes of small work on gears, and shall be glad to submit estimates if you will send us samples of your work.

One, Two and Three-cut Pinion Cutters.
One or Two-cut Gear Cutters.

Write for Particulars.

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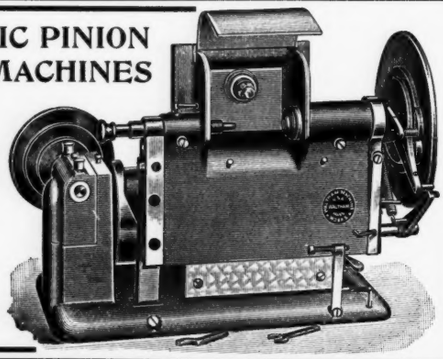
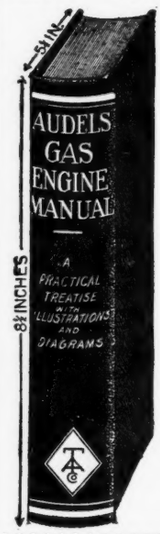
Newton Street, WALTHAM, MASS.



GAS ENGINE MANUAL



¶ This volume just published gives the latest and most helpful information respecting the construction, care and management of **Gas, Gasoline** and **Oil Engines, Marine Motors** and **Automobile Engines,** including chapters on Producer Gas Plants and the Alcohol Motor.

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GOLD MEDAL AT JAMESTOWN

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The U. S. Government paid this Company a big compliment when it selected the "OTTO" engine for use in making fuel tests at the Jamestown Exposition.

The Jury of Awards also proved its fitness for its task when it **Awarded the "OTTO" the GOLD MEDAL.** The "OTTO" has won **FIRST PRIZE** at every large Exposition held in this Country since the Centennial in '76.

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Finished Machine Keys

Cheaper than you can make them. Finished "Ready to Drive."

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All sizes carried in stock. Write for discounts.

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BALL BEARINGS

1-4 in. Shaft and up.
No fitting, just push them on.
10 cts. in stamps for sample.

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Horizontal Drilling, Boring and Milling Machines.

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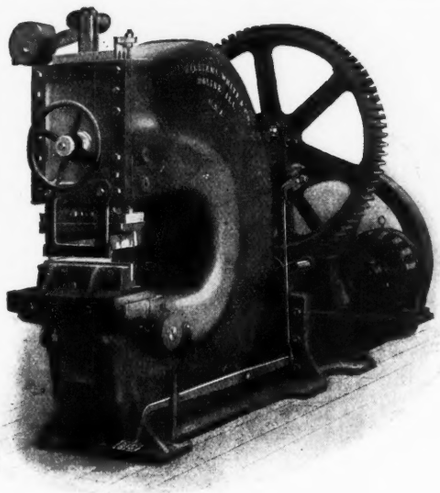

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Multiple Punches Upsetters and Taper Rolls
Gate Shears Heavy Forging Machinery

WILLIAMS, WHITE & CO.

MOLINE, ILLINOIS

IT DOES NOT TAKE A PAGE TO TELL OF

Carpenter's Machine Screw Taps

OLDEST ON THE MARKET!

NONE SUPERIOR!

THAT'S ALL.

Made to A. S. M. E. Standard at regular price.

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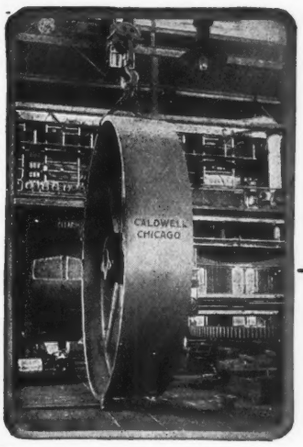

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No Walker band wheel or fly wheel has ever been known to burst. These wheels were designed expressly to replace other wheels that had burst. We have all the Walker data, standards, drawings, patterns and preparations, and are making Caldwell-Walker wheels along the old, time-tried lines. Our product is as good as past experience, modern skill and high-class equipment can make it. If you need a wheel now, write us; if not, better file this advertisement for future reference.

H. W. Caldwell & Son Co.

Chicago, Western Ave., 17th-18th St.

4 NEW YORK: Fulton Bldg., Hudson Terminal, 50 Church St.

STEEL Shop Barrels and Boxes

Illustrating one of our Triple hem Shop Barrels fitted with a solid stamped steel bottom, allowing the barrel, when heavily loaded, to be easily rocked, or tipped over on to an ordinary barrel truck.

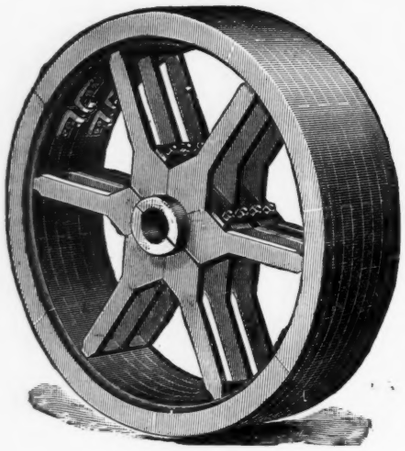
Factory Shelving and Adjustable Tool and Supply Racks.

Catalogue No. 27.

The Cleveland Wire Spring Co.

Cleveland, Ohio.

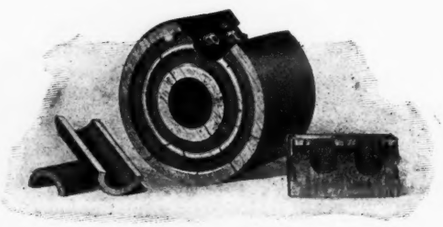
Gilbert Wood Split Pulleys



Style B.

are of special construction, and in correctness of balance and trueness of running excel all other wood pulleys. The hard, close grained maple wood used in their manufacture provides the face of the pulley with a polished surface that gives perfect contact to the belt and allows the same power to be transmitted with far less tension, thus prolonging the life of the belts and effecting a very considerable saving in power.

Gilbert Pulleys are light; the spokes are so set they *cut the air* instead of fanning it. They can be put on or taken off the shaft easily and quickly, will withstand a greater degree of heat or moisture than any other wood pulley, and can be run with perfect safety at from two to three times the speed of iron pulleys.



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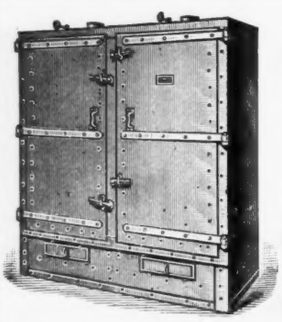
Saginaw, W. S. Michigan.

Sales Agents in all the Principal Cities of the World.

New York Branch, 88 Warren Street. Chicago Branch, 28-32 South Canal Street.
Cable Address, Engrave. A. B. C. and Lieber's Codes.



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Designed to meet special conditions. Heated by gas and adaptable for many lines of manufacture. Special burners used for drying materials containing much moisture.

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Bronzing, Japanning, Baking, Enameling, Drying.

Made in any size required. Write for prices.

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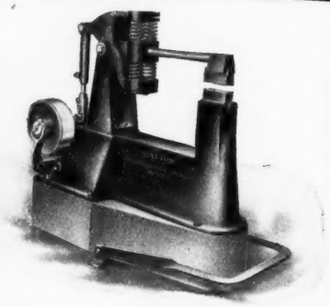

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Very simple in construction, efficient and strong. Will soon pay for itself in your blacksmith work.

Send for circular.

The Foglesong Machine Co.
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DAYTON, OHIO

Radial Ring Bearings

"NOISELESS"

Bantam Anti-Friction Co.
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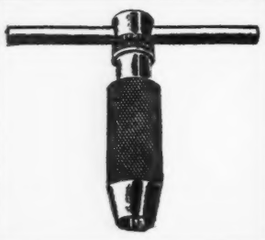
OUR SPECIALTY,
Automatic Machinery
for making **Wood Screws,**
Asa S. Cook Co., HARTFORD, CONN., U. S. A.



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We wish to introduce our New "R. D." Series Reece Screw Plates with twist drills included. Very convenient and sure to please every mechanic. If your dealer will not supply you, send $4.25 for set "R. D. 2," cutting seven sizes, viz: No. 4-36, No. 6-32, No. 8-32, No. 10-24, No. 12-24, No 14-20, No. 16-18 complete in polished hardwood case with a twist drill, tap and adjustable die for each size. Die stock and adjustable tap wrench also included. Satisfaction guaranteed.

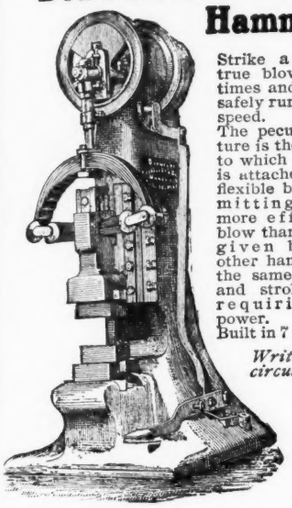
We make a specialty of Screw Plates, Taps and Dies, etc.

E. F. REECE CO., Greenfield, Mass.
New York Store: 101 Reade St.

"REECE"

DIE

"Dead Stroke" Power Hammers

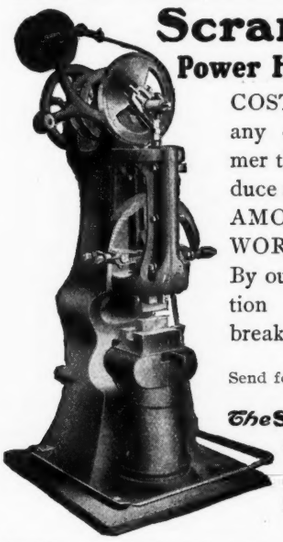


Strike a square, true blow at all times and can be safely run at high speed.
The peculiar feature is the spring, to which the ram is attached by a flexible belt, permitting a far more effective blow than can be given by any other hammer of the same weight and stroke, and requiring less power.
Built in 7 sizes.

Write for circulars.

MANUFACTURED BY
Dienelt & Eisenhardt, Inc.
1304 No. Howard St.
Philadelphia, Pa., U.S.A.

Scranton Power Hammers

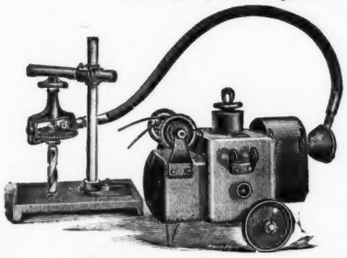


COST LESS than any other hammer that will produce an EQUAL AMOUNT OF WORK.
By our construction we avoid breakdowns.

Send for Circular 37.

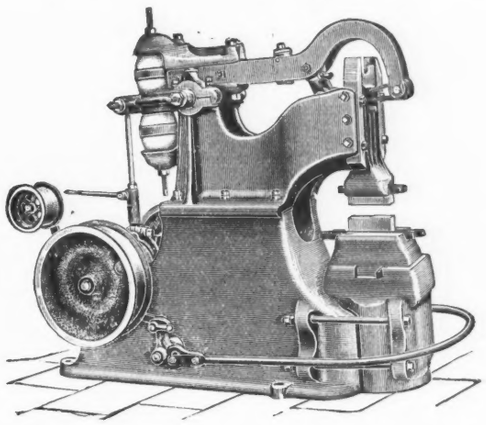
The **Scranton & Co.**
New Haven, Conn.

Combination of
Stow Flexible Shaft
and
Multi-Speed Electric Motor.
Portable Drilling, Tapping, Reaming, Etc.



Stow Mfg. Company,
Binghamton, N. Y.
Selig, Sonnenthal & Co., General European Agents, London, Eng.

THE SCHWERDTLE STAMP CO.,
STEEL STAMPS & DIES
BRIDGEPORT, CONN.



Bradley Upright Hammers

Are made with heads weighing 15 to 500 pounds. Each contains one-third to one-half more material than those of any other make of the same rating.

Their anvil blocks weigh nearly or quite double those of other hammers.

Their output is guaranteed 25 per cent. greater than is possible with other hammers of same rating or no sale.

More Bradley Hammers are sold each year than all other power hammers combined.

WE MAKE

The Bradley Cushioned Helve Hammer. **The Bradley Upright Helve Hammer.**
The Bradley Upright Strap Hammer. **The Bradley Compact Hammer.**
Forges for Hard Coal or Coke.

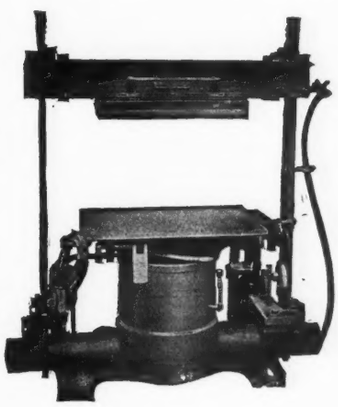
SEND FOR CIRCULARS.

C. C. Bradley & Son, Syracuse, N. Y., U.S.A.

FOREIGN AGENTS: Schuchardt & Schütte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schütte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Buck & Hickman, Whitechapel Road, London.

PATTERNS of Every Description.
Penn Pattern Works, Chester, Pa.

Tabor Molding Machines.



Cut shows 13" Cylinder Power Squeezer designed to squeeze the sand to the proper density instead of ramming by a blow.

Machine is adapted for use with Vibrator Frame, Paraffine Board or Plated Pattern.

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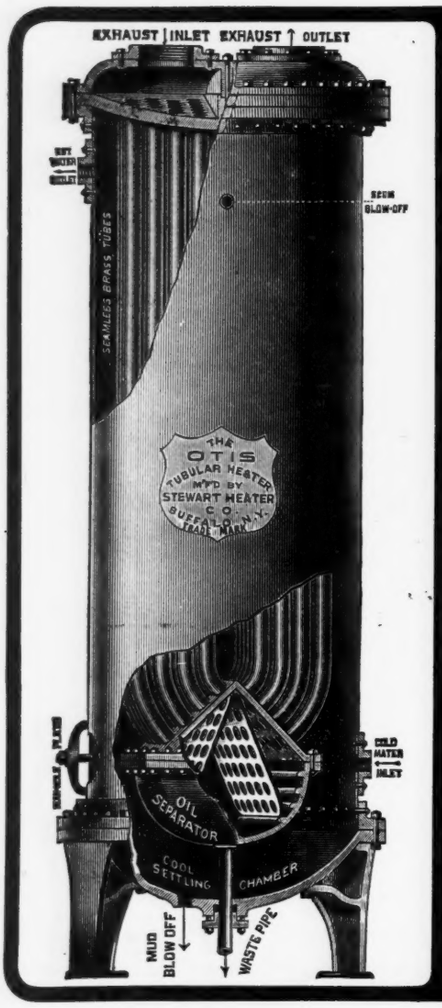
The Tabor Manufacturing Co.,
18th and Hamilton Streets
PHILADELPHIA, PENNSYLVANIA



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Tubular Feed Water Heater, Oil Separator and Purifier

is not an experiment but a tried and trusted appliance that the makers are not afraid to

GUARANTEE

To heat the feed water to the *boiling point* (210 to 212 degrees) with the exhaust steam without causing any back pressure, *also to extract the oil from the exhaust*, so that the exhaust steam after being passed through the heater can be used for heating purposes, and the water of condensation for the heating system be returned to the boiler without the *additional expense* of an *eliminator*.

We are so sure of the OTIS that we agree to pay all cost of a trial—freight, cartage, piping, etc.—if it fails to do all we claim for it.

Catalogue and Prices at your Service

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POOLE ENGINEERING & MACHINE CO.
ENGINEERS, FOUNDERS AND MACHINISTS.
BALTIMORE, MD.
MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY,
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS.
HAND, ROPE AND FLY WHEELS. FRICTION CLUTCHES, SHAFTING, PULLEYS AND HANGERS.
MACHINE MOLDED AND PLANED GEARING.
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POOLE-LEFFEL TURBINE WATER-WHEELS
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CIRCULARS ON APPLICATION
IRON CASTINGS 30,000 LBS. TENSILE STRENGTH.

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IF you are only familiar with oil and grease lubrication, well—look out for ruts. What is the benefit derived from adding Dixon's Flake Graphite to oil or grease? Hundreds of successful engineers testify that it lessens friction, prevents cutting, saves lubricant. Can you answer this question from "first hand" experience?

Write for free booklet 74-C and a sample.

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(Style of 12 and 24 Sizes.)

Measuring Machines.

Measuring screw, 10, 16 or 20 threads to the inch, graduated to read thousandths or 32ds without calculation.

The only Micrometer that will not lose its accuracy by wear.

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WOODMAN & HUDSON'S Speed Indicator.

An ingenious little instrument for ascertaining the correct speed of Dynamos, Steam Engines, Shafting, Floor Machines, etc. No first class mechanic, superintendent or factory should be without one. They are adapted to hollow or pointed centers, and are absolutely correct. Every indicator is handsomely nickel-plated and of convenient size to carry in the pocket.

Price: Split Cap, adapted to either pointed or hollow centers, $1.00.
Plain Cap for hollow centers only, 75c.

We also keep a Double Registering Speed Indicator. Prices on application.

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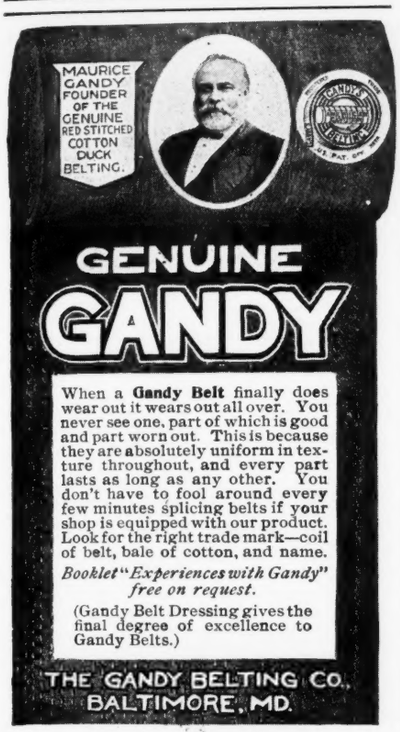
FRITZ & GOELDEL MFG. COMPANY
60 Alabama St., GRAND RAPIDS, MICH.



GENUINE
GANDY

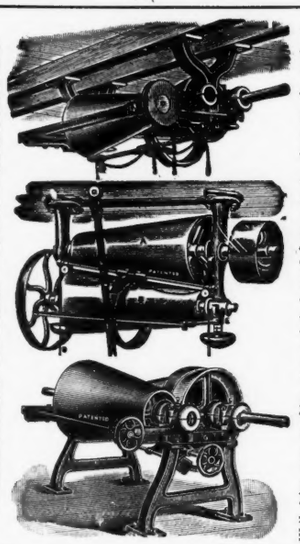
When a **Gandy Belt** finally does wear out it wears out all over. You never see one, part of which is good and part worn out. This is because they are absolutely uniform in texture throughout, and every part lasts as long as any other. You don't have to fool around every few minutes splicing belts if your shop is equipped with our product. Look for the right trade mark—coil of belt, bale of cotton, and name.

Booklet "Experiences with Gandy" free on request.

(Gandy Belt Dressing gives the final degree of excellence to Gandy Belts.)

THE GANDY BELTING CO.
BALTIMORE, MD.

Evans Friction Cone Pulleys
VARIABLE SPEED COUNTERSHAFTS



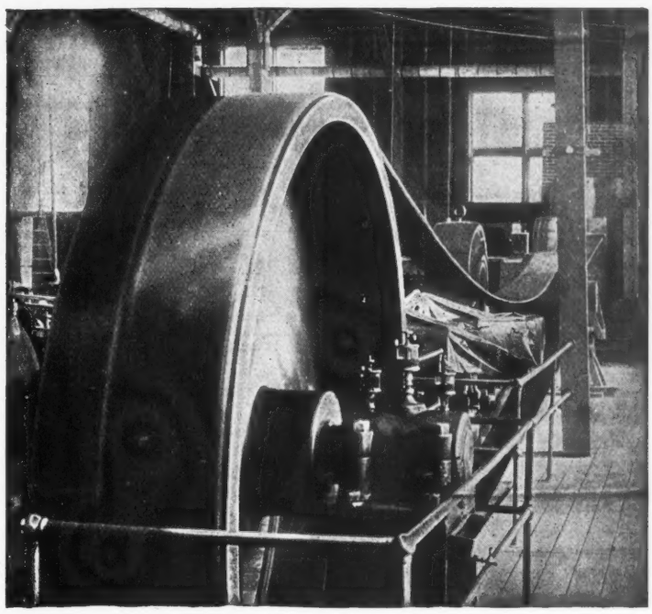
Will drive your machine at any desired speed from 1 to 6. Over ten thousand sets in operation in this country and Europe. Send for catalogue.

G. F. Evans, Newton Center, Mass.

Metal Polish

Highest Award
Chicago World's Fair, 1903.
Lousiana Purchase Exposition, St. Louis, 1904.

3-oz. Box for 10 cents.
Sold by Agents and Dealers all over the world. Ask or write for **FREE** samples.
5-lb. Pails, $1.00.
GEO. W. HOFFMAN,
Expert Polish Maker,
Indianapolis, Indiana.



Old or Oily Belts

Don't throw these away.

Treat them with Cling-Surface and make them new again.

This belt was old, full of oil and dirt (we took 30 lbs. off it) when put on.

It was very tight and wouldn't half work.

We scraped it, treated and slacked it up and it was doing 140 H.P. when photographed and doing it easily.

The oil was coming through the back in drops—pushed out by the Cling-Surface.

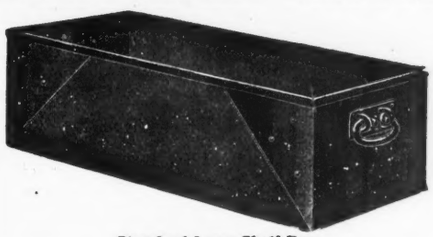
You can take any belt you have, new or old, dry or oily, use Cling-Surface and run it slack, no matter what its position, and pull fullest loads.

We guarantee it. Try Cling-Surface and see.

Write us. We have a mighty interesting matter for you.

CLING-SURFACE CO 1018 Niagara St Buffalo N Y
New York Chicago Boston Phiiadelphia St Louis London Thomas & Bishop 119-125 Finsbury Pavement E C

LYON STEEL FACTORY EQUIPMENT



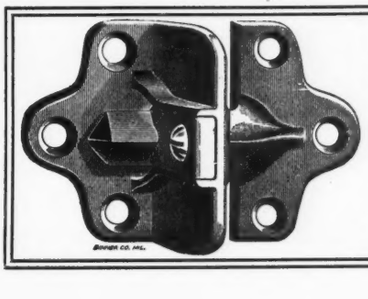
Standard Lyon Shelf Box.

For Your Own Satisfaction

take up with us the subject of **Steel Boxes** and **Barrels** for handling small parts and castings.

We will gladly quote prices and give you full information if you will but suggest your requirements.

LYON METALLIC MFG. CO., - AURORA, ILL.



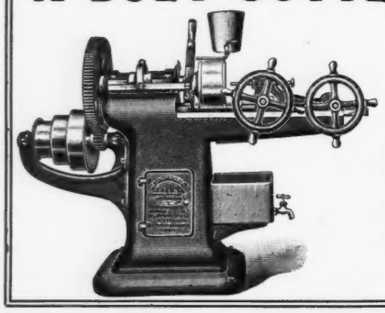
Frazer's Adjustable Malleable Iron Flask Pin

saves time, expense, and makes true castings. Quickly applied and easily adjusted.

Send for prices on our line of Pattern Makers' Specialties.

Milwaukee Foundry Supply Company
Milwaukee, Wis.

A BOLT CUTTER IS MUCH LIKE A MAN IN THIS:



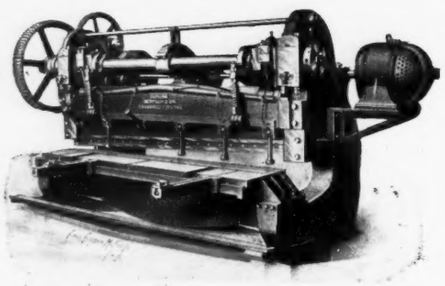
The Head Is Nearly Everything

The Merriman Bolt Cutter Head is Noted for

1. Simplicity of the head; Only four parts, consequently,
2. Great Durability. Few repairs needed.
3. Square Bearing of the Dies in the Ring; consequently,
4. Solidity of the Dies like a Solid Die;
5. Consequently, Uniformity of the product; Bolts all the same size.
6. Effectiveness of Operation; Cheapest help can understand and run it.
7. No machine turns out work more rapidly.

THE H. B. BROWN CO., EAST HAMPTON, CONN.

Send for Catalog No. 12.

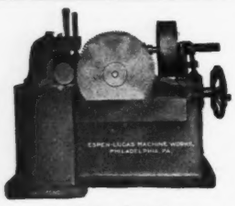


Mill Shear

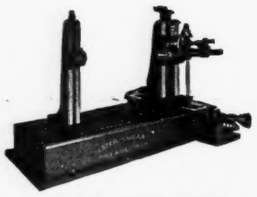
This cut shows our No. 8 Shear designed especially for Rolling Mill shearing on ¼" and lighter plates. Note that it has our Patented Gag Hold-down which does not obstruct the view of the shearing line. It is built with motor, engine or belt drive. We have had twenty-five years' experience as builders of Punches, Shears and Bending Rolls.

Write for Catalogue "N."

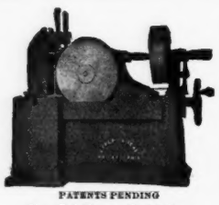
Bertsch & Co.
Cambridge City, Ind.



No. 7 Bar Cold Saw



No. 2 Horizontal Floor Boring Milling and Drilling Machine

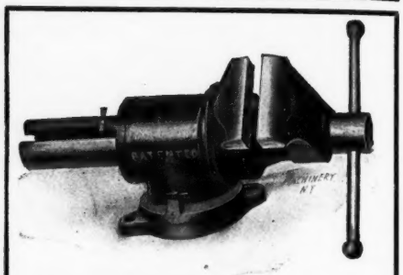


PATENTS PENDING
No. 2 I Beam Cold Saw

WRITE FOR CATALOG

ESPEN-LUCAS MACHINE WORKS

Broad and Noble Streets, PHILADELPHIA, PA.



"F&R" Vises

Guaranteed to give the best service, to be made of the best materials and to be the best for the work for which they are intended.

Price is right too. Ask your dealer for the F. & R. Vises.

Fulton Machine and Vise Co.
LOWVILLE, N. Y.
74-76 Murray St., New York. 68-70 So. Canal St., Chicago.

"CINCINNATI" PUNCHES

THE CINCINNATI PUNCH & SHEAR CO., Cincinnati, Ohio

LOOK THIS OVER

The MARVEL SHEAR and PUNCH BEATS THEM ALL

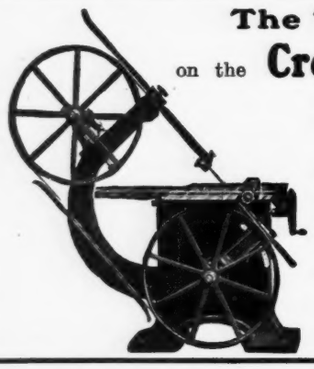
LET US SEND YOU ONE ON TRIAL.

Write to-day for descriptive Circular of this and other punches and Shears.

Armstrong-Blum Mfg. Co.
113 N. Francisco Ave., Chicago, U. S. A.

The Table is always Level

on the **Crescent Angle Band Saw**



though the saw may be tilted to any angle up to 45 degrees.

This machine has every good point for regular square sawing and the advantage of a tilted saw and level table for bevel sawing—saving time, labor and inaccuracy. All parts work automatically—to change the angle of the saw just turn the hand wheel at the side of the table, no other adjustment is necessary, blade can be tilted while in motion.

Adapted for all kinds of work. Simple, practical, and reasonable in price. *Send for circulars.*

The Crescent Machine Co.
56 Main Street, LEETONIA, OHIO

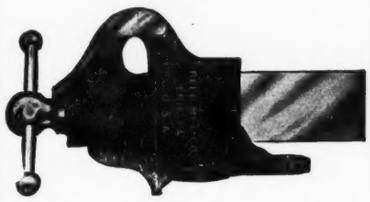
COMPARE with your present Handle costs our prices for Ball Cranks and Machine Handles of every description, from bar steel. Accurate, highly finished, complete in every detail and ready to attach.

The Cincinnati Ball Crank Co.
Cincinnati, Ohio
Successors to this dept. of the SCHACHT MFG. CO.

Bound Volumes of Machinery
The Industrial Press, New York.

QUALITY TELLS

its own story.



REED VISES

will grip and hold when the ordinary vise will slip and spoil the work.

The Reed Guarantee
is back of every one sold.

Let us send you Catalogue H.

REED MFG. CO., Erie, Pa.

The Service in Any Shop

will be quicker and better if this

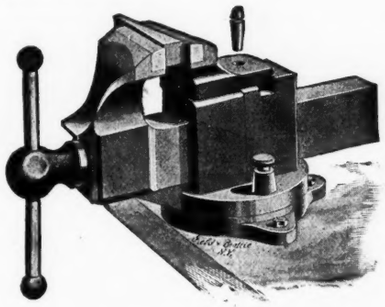
All Metal Truck

is part of its equipment. Holds tools or work as needed, is light running, can be quickly moved from place to place—never oil soaked or out of repair. One of the conveniences of the day, and one of the most durable devices in the market.

WRITE FOR OUR NEW BOOKLET OF SHOP FURNITURE.

New Britain Machine Co.

New Britain, Connecticut

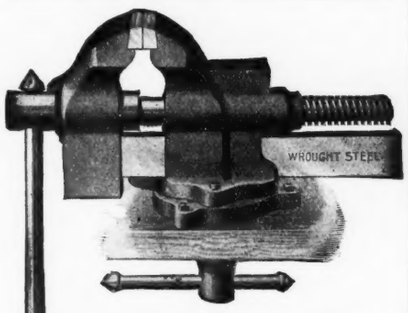


Machinists' Swivel Vise

with self-adjusting jaw that is as strong and durable as any solid jaw, and a Swivel Bottom that gives any desired adjustment to right or left, and is solid and firm at any angle. We make all sorts of good vises, and have been leaders in this line for twenty years. Send for catalogue and price list.

Prentiss Vise Company,
44 Barclay Street, New York.

Agents for Great Britain, Chas. Neat & Co., 112 Queen Victoria St., London, E. C.

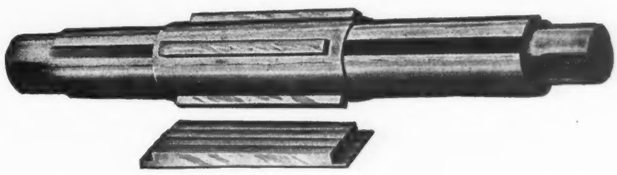


WROUGHT STEEL BAR COMBINATION BASE

MERRILL BROS., MASPETH, NEW YORK, N. Y.

Still Sorting over those Solid Mandrels?

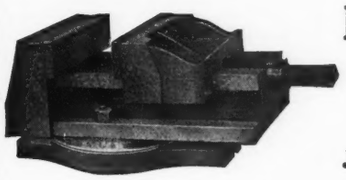
Better throw the whole lot into the scrap heap and get a set of **NICHOLSON EXPANDING MANDRELS,** they are what you want.



A set of nine of these will fit you out for work anywhere from one to seven inches in size, and you'll have the job done in the time it takes to look for an ordinary mandrel that's just the size required. Workmanship and material the best. Catalogue gives full description.

W. H. NICHOLSON & CO., Wilkes-Barre, Pa., U. S. A.

FOREIGN HOUSES: C. W. Burton, Griffiths & Co., London. Schuchardt & Schutte, Berlin, Cologne, Vienna, Brussels, Stockholm and St. Petersburg.



Plunket Improved Vises

Made with Plain or Swivel Base

Specially adapted for the hard service of the machine shop. Can be used with every style drill-press, shaper and milling machine. Strongest construction, steel screw, steel faces to jaw, cast steel handle. Write for further information.

J. E. PLUNKET, Chicago, Ill.
47-49 South Jefferson St.

DRILL
VISES and SPEEDERS

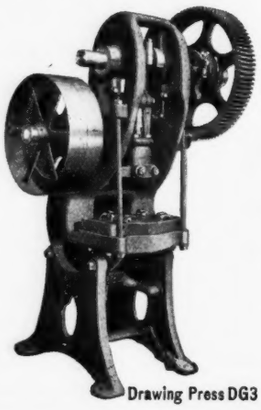
SEND FOR CIRCULARS

THE GRAHAM MFG. CO., Providence, R. I.

FERRACUTE PRESSES

HUNDREDS OF SIZES AND STYLES FOR EVERY KIND OF WORK

Illustration shows a throated side-action Drawing Press with long stroke, adapted for deepening shallow shells previously drawn in a double-action press. This machine is suitable for a wide range of single-action work. Built with or without gearing. Inclinable. Five sizes.



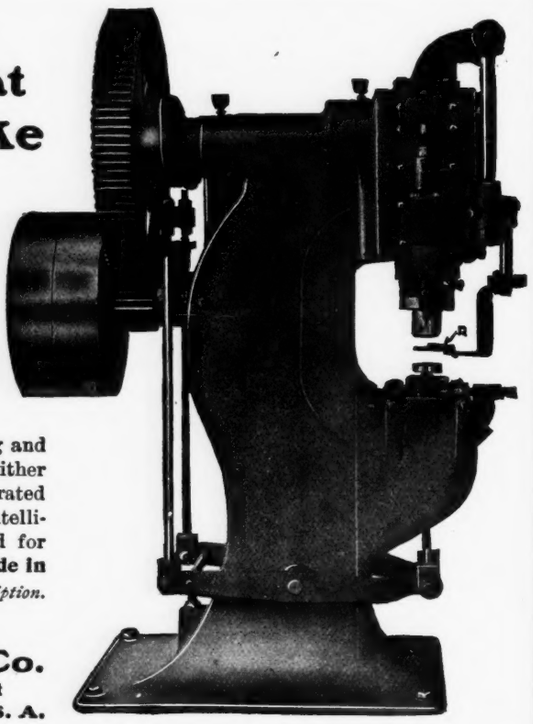
Drawing Press DG3

Photographs and full information on request.

FERRACUTE MACHINE COMPANY
Bridgeton, New Jersey

European Agents: Chas. Churchill & Co., London; Fenwick Freres & Co., Paris; American Machinery Co., St. Petersburg; Wilh. Sonesson & Co., Copenhagen.

Cuts and Punches at One Stroke



This new Punching Machine is adapted for cutting and punching of almost every kind, but is especially valuable for making washers from scrap plate metals or fibre, and for cutting armature discs, hardware and electrical specialties from hard or soft metal.

It is very rapid, cutting and punching at one stroke, either single or multiple; can be operated by any person of ordinary intelligence, and can be arranged for shearing when desired. Made in four sizes. *Write for full description.*

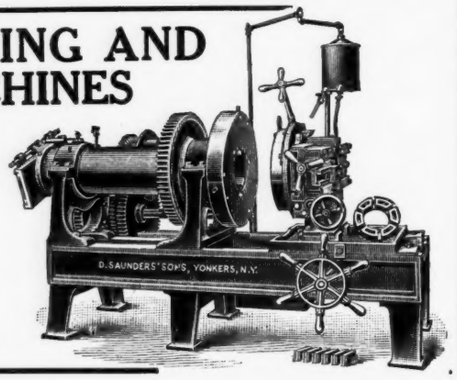
Krips-Mason Machine Co.
1636 North Hutchinson Street
Philadelphia, Pa., U. S. A.

PIPE THREADING AND CUTTING MACHINES

Our Improved No. 6 Standard Machine with patent adjustable expanding die head and interchangeable chasers

Cuts off and threads pipe 2½ to 8 inches. A special arrangement of gearing permits ample power and suitable speeds for working the various sizes of pipe and avoids the use of large pulleys and tight belts. Every improved feature for rapid and accurate operation.

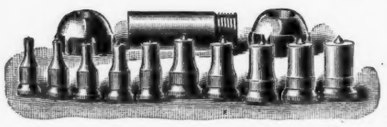
Write for detailed description.



D. SAUNDERS' SONS
YONKERS, N. Y.

I. P. RICHARDS COMPANY

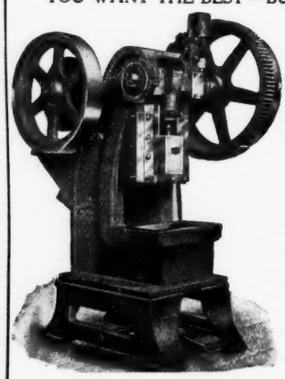
U. S. Standard Punches



For all Structural Work

PROVIDENCE, R. I., U. S. A.

"YOU WANT THE BEST—BUY OF US"



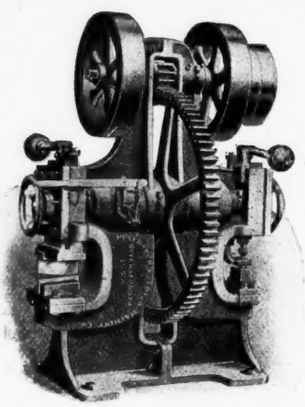
A Complete Line of Standard Styles and Sizes of "Toledo" Presses

IN STOCK FOR IMMEDIATE DELIVERY

"Toledo" Open Back Power Presses are the result of 20 years' experience in the designing and building of sheet metal machines and tools **exclusively**, and the demand for them from all parts of the world **proves their superior capacity, accuracy, economy and durability.**

The Toledo Machine & Tool Co.
Toledo, Ohio, U. S. A.

AGENTS—Ludw. Loewe & Co., Berlin, Germany. Selig Sonnenthal & Co., 85 Queen Victoria St., London, England.



ROYERSFORD Punch and Shear.

Built for service. Requires but little floor space. Various sizes.

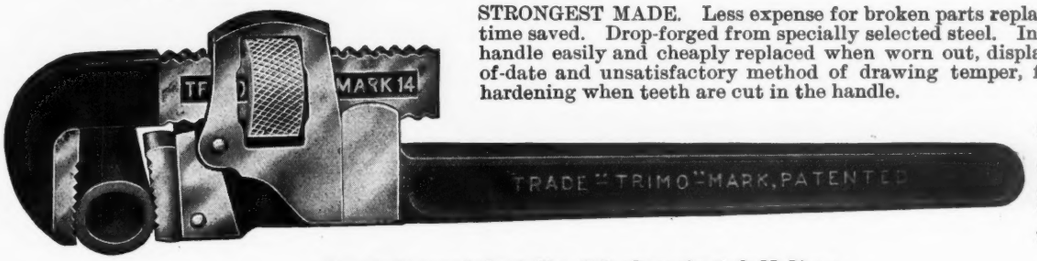
If you are interested in the best in this class of machinery write for our Catalogue.

Royersford Foundry and Machine Co.
Royersford, Pa.

CUT OUT AND FILE the three **Shop Operation Sheets** in this number. Your set **may be** worth a hundred dollars to you some day.

"TRIMO" PIPE WRENCH

TRADE MARK

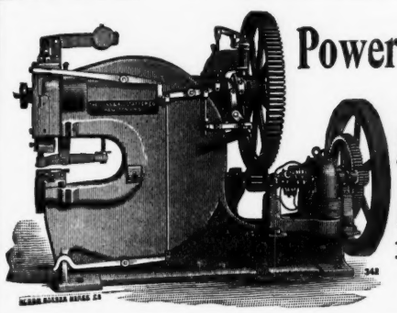


STRONGEST MADE. Less expense for broken parts replaced as well as time saved. Drop-forged from specially selected steel. Inserted jaw in handle easily and cheaply replaced when worn out, displacing the out-of-date and unsatisfactory method of drawing temper, filing and re-hardening when teeth are cut in the handle.

GOLD MEDAL
St. Louis, 1904.

Send for catalog No. 38 showing full line.

TRIMONT MFG. COMPANY, 55 to 71 Amory St., Roxbury, Mass.



Power Punching and Shearing Machines

Belt, Steam and Electrically driven.

LONG & ALLSTATTER CO.

HAMILTON, OHIO, U. S. A.

Our machines are made in over 350 sizes and varieties.

SINGLE,
DOUBLE,
UPRIGHT,
HORIZONTAL,
GATE,
MULTIPLE,
FOR
Railroad Shops,
Locomotive Shops,
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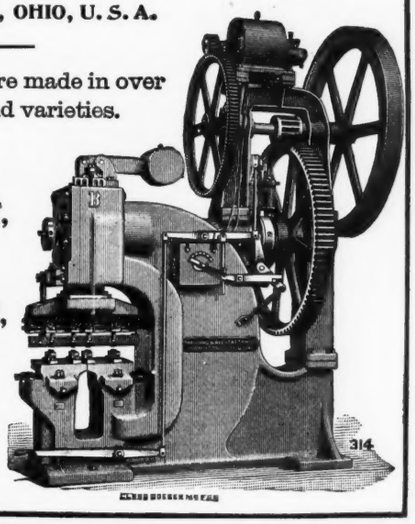
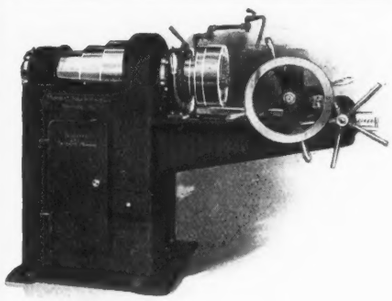
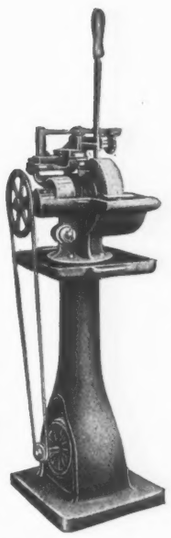
Etc.



"Plurality Die" Bolt Cutters



Simple, strong, compact, very few parts, no exposed gearing. Automatic throw-out opens the dies quickly with no jar to head.

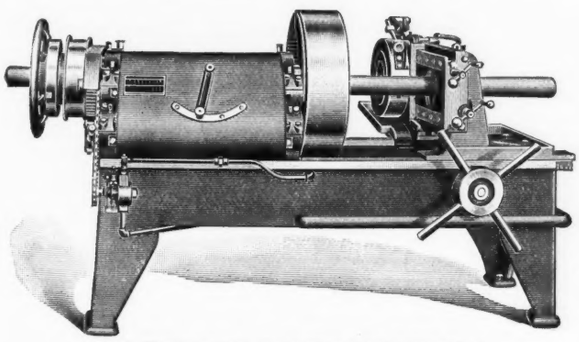


THE "PLURALITY DIE"
is the special feature of this machine, a single set doing the work of twelve of the ordinary kind. Will cut all commonly used threads from ¼" to 1½". **Durability and Low Cost of Maintenance** strong points.

Keep your scrapers in good condition with the
REVOLVING OILSTONE SHARPENER
This improved machine puts on a straight, keen edge that will stand much work without needing regrinding. Adapted for other work, easily portable and can be operated by unskilled labor. Ask for the catalogue.

Mummert, Wolf & Dixon Co.

HANOVER, PA.



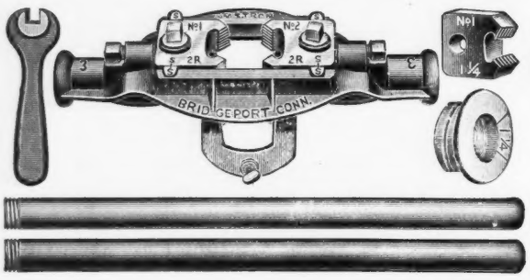
4-inch Machine with Steel Clad Sliding Die Head.

A SLIDING DIE HEAD ON A PIPE THREADING MACHINE

is absolutely necessary to get the most and best work out of it. Pipe does not come perfectly round, neither is it straight. If the head can move it will follow the pipe and you will get better work with less wear on the machine and dies. ¶ You can also put the pipe in and take it out thro the die stand **without dragging it across the dies and taking the edge off.** ¶ You can also cut off closer to the gripping chuck which saves time and makes money.

The Stoever Foundry & Manufacturing Co.

LEBANON, PA.



THE

Genuine Armstrong Stock and Dies

ARE

Unequaled in Efficiency, Accuracy and Simplicity

Are carried in stock by all Leading Jobbers in the country. Engineers and Steam Fitters require good tools. Go to your nearest dealer and get the **Genuine Armstrong Tools** which have stood the test for years. Manufactured by

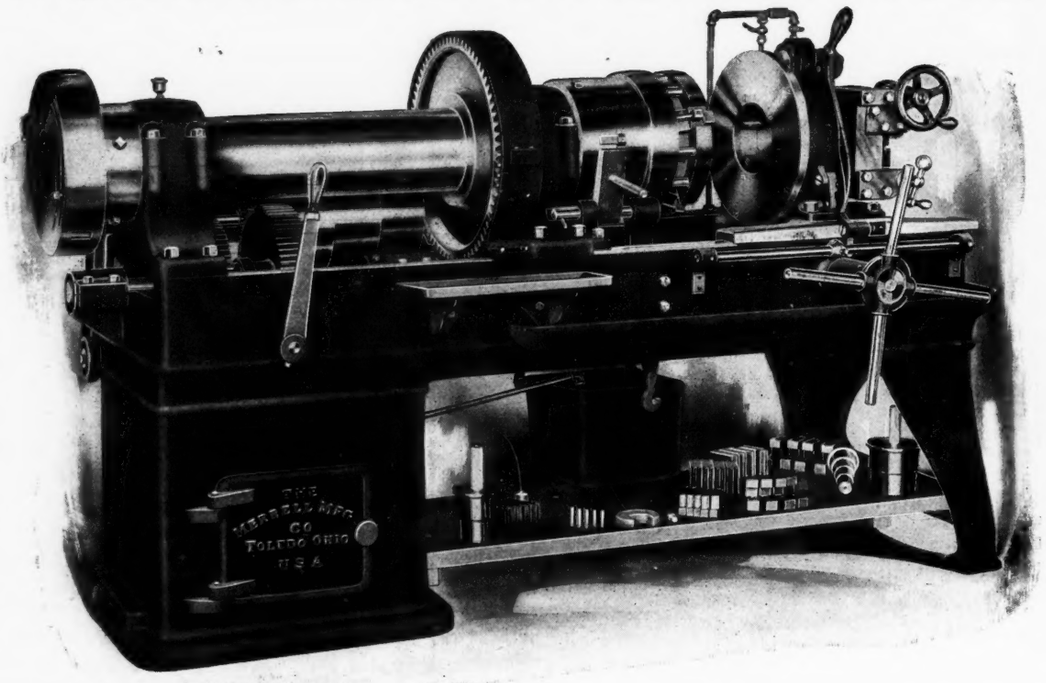
THE ARMSTRONG MFG. CO.

297 Knowlton Street, BRIDGEPORT, CONN.

This Trade Mark on all our goods.

WHAT THE MERRELL MACHINE MEANS TO YOU:

Merrell Pipe Threading and Cutting Machines mean *greater* work, and *better* work. Merrell Machines mean more *economical* work, and easier work for the operator. Merrell Machines mean greater efficiency and economy, and extreme simplicity and ease of operation.



This Merrell Apex Nos. 1 and 2 is designed and built for the man who has great quantities of pipe of one size to be cut. It has a special arrangement for cutting very short pieces of pipe. It has a special threading gauge that automatically cuts the pipe when the desired length has been threaded. It will cut steel or iron pipe *equally well*. It will cut nipples satisfactorily. Why not let us tell you further about this Machine? Why not get the Merrell catalogue?

30 DAYS FREE TRIAL

THE MERRELL MFG. CO., 15 Curtis St., Toledo, O.

Pipe Threaders and Cutters

With efficiency as well as beauty.

Heavy—none more so; bed cast in one piece, no stands nor legs to work loose. No oil soaked floors; fire risk reduced.

Single speed pulley; all gear speed changes through semi-steel cut gears.

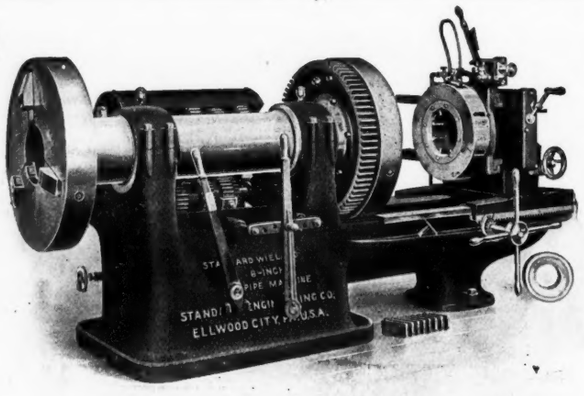
Deep chasers cutting long taper perfect threads in one cut as easily on steel as on iron pipe.

Let us prove to you that the higher cost of a modern tool is justified by the character and quantity of its product. Circulars for the asking.

Standard Engineering Co.,

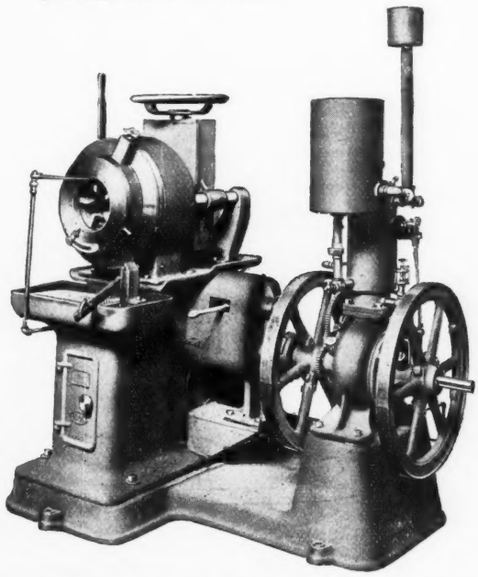
Ellwood City, Penna.

St. Louis Office: 1012 Chemical Bldg.



The LOEW VICTOR Gas Engine Driven Outfit

Newest and best thing in Pipe Machinery ever offered to the trade.

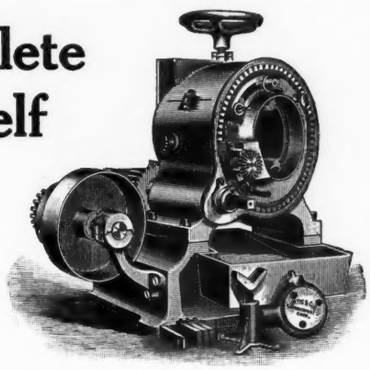


Self-contained—Will operate under any conditions—Neat—Compact—Fills a long-felt want.

Catalog on request.

THE LOEW MFG. CO., Cleveland, O.

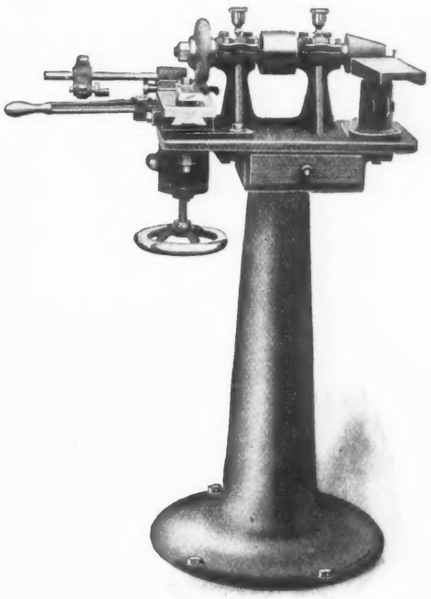
Complete in Itself



There are no vises or other accessories needed with the **Forbes Patent Die Stock**—it is a complete tool for cutting off and threading pipe, doing the work so easily that one man, unaided, can cut off and thread pipe up to 15 inches by hand. Machines are arranged for hand or power, are easily portable, especially convenient for use in cramped quarters and have all parts interchangeable.

Send for latest catalogue showing sizes, prices and capacities of our machines.

The Curtis & Curtis Company
8 Garden Street, Bridgeport, Conn.



DEBUT

It is needless to say that steel pipe requires a sharp, properly shaped die to cut a good thread. The little machine shown here is the

B. & K. Die Grinder

for the correct grinding of the dies. Simple to operate, moderate in price, and will save you dollars.

Get the folder.

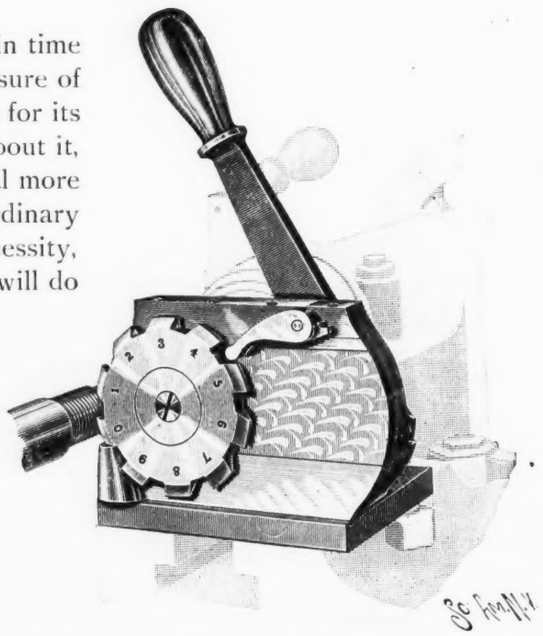
Bignall & Keeler Mfg. Co.
EDWARDSVILLE, ILL.

THE RIVETT-DOCK THREADING TOOL

FOR ACCURATE THREADING AND DUPLICATE WORK

You not only save from 25 to 75 per cent. in time with this device, but you can be absolutely sure of exact results. Skilled labor is not required for its operation, there is nothing complicated about it, and a boy with this tool will do a great deal more and better work than an expert using the ordinary thread tool. Grinding is an infrequent necessity, with one sharpening the Rivett-Dock Tool will do as much work as a hundred of the single point variety. Practically a shop necessity and now in use in the best equipped plants in the country. As a labor saver it stands in the front rank and we shall be glad to send one on Thirty Days' Free Trial.

Ask for a Catalogue.

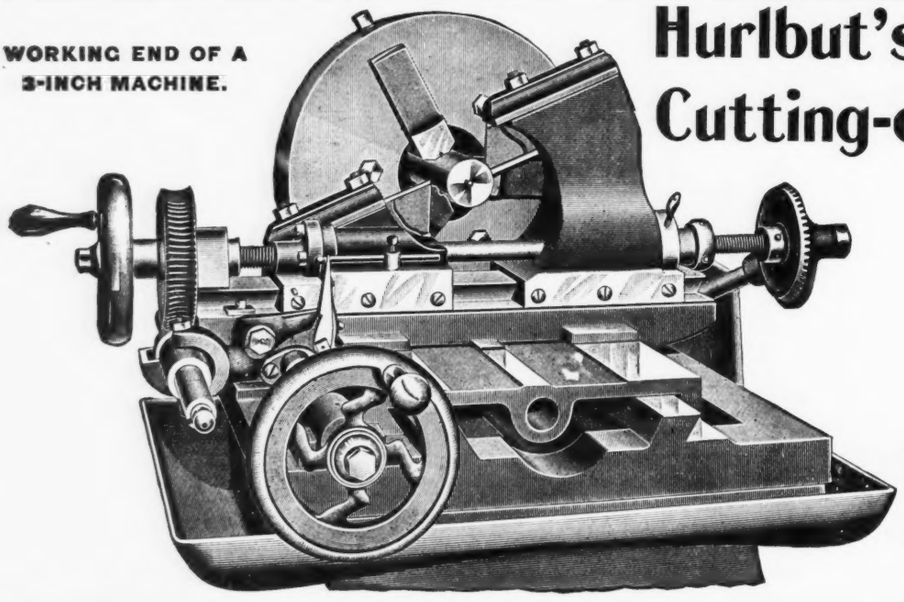


We manufacture the Rivett Precision Lathes and Internal Grinders.

RIVETT LATHE MFG. COMPANY,

Brighton District BOSTON, MASSACHUSETTS

WORKING END OF A 3-INCH MACHINE.



Hurlbut's Patent Cutting-off Machine

Made in 2-inch, 3-inch, 4-inch, 5-inch, 6-inch, 8-inch and 10-inch sizes.

Circulars on application.

HURLBUT-ROGERS MACHINE CO.

So. Sudbury, Mass.

No better Crucibles than ours can be made. The very best that skill, experience and finest quality of materials can produce.

McCULLOUGH-DALZELL CRUCIBLE CO., Pittsburgh, Pa.

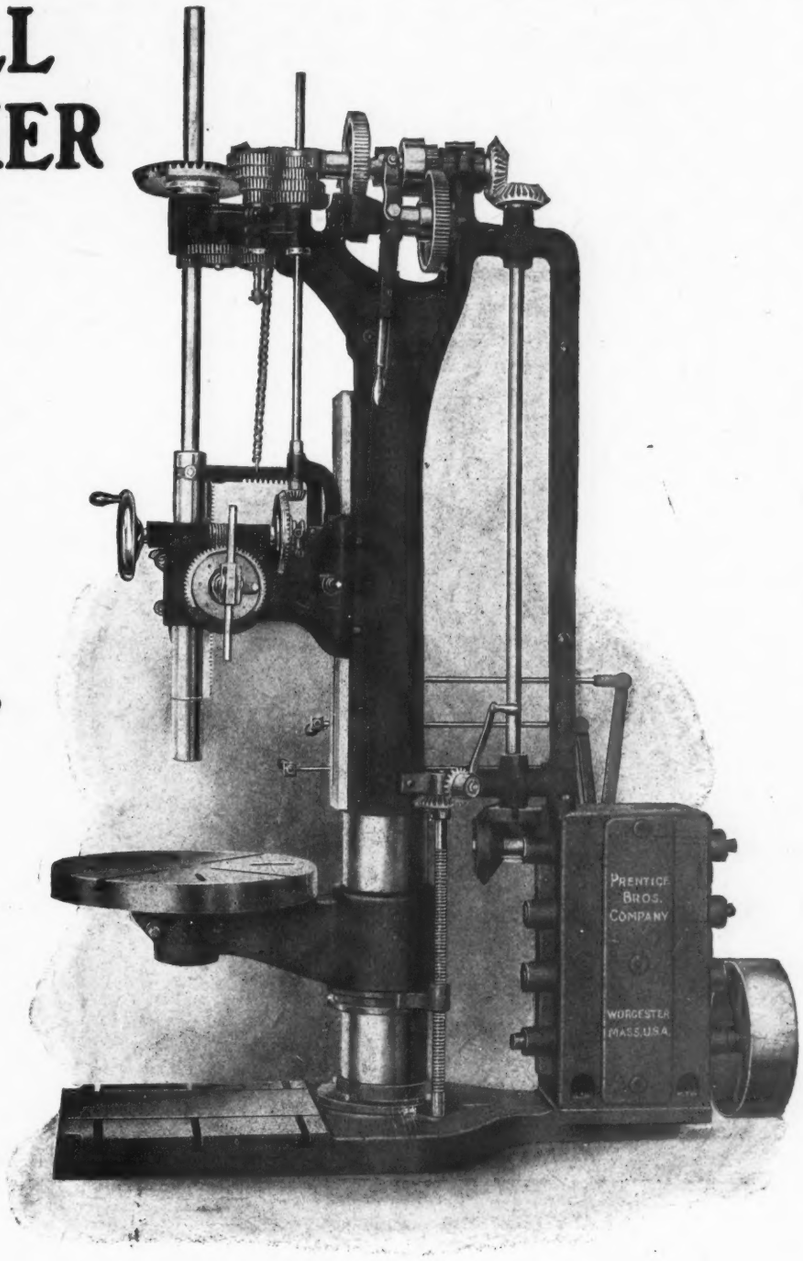
THE DRILL PACE MAKER

There are all kinds of drills which do all kinds of work, but if you want a drill that combines both **Quality** and **Quantity** of work, then its up to you to try a

"PRENTICE"

One of our Gear Driven Upright Drills in your factory is a booster to your bank account. It saves you money on every hole it drills.

Shall we send you a circular?



Some of its Many Salient Features

16 changes of speed and 4 changes of feed obtainable while machine is in motion; quick approach and return of spindle; roller clutch; automatic trip for feed; friction tapping attachment; engagement and disengagement of back gears while in motion; and its superior general construction.

PRENTICE BROS. COMPANY, Worcester, Mass., U. S. A.

AGENTS—The Fairbanks Company, New York, Albany, Boston, Philadelphia, Syracuse, Hartford, New Orleans and Buffalo. The Strong, Carlisle & Hammond Company, Cleveland and Detroit. Charles G. Smith Company, Pittsburg. The O. L. Packard Machinery Company, Chicago and Milwaukee. The Marshall & Huschart Machinery Company, St. Louis. Alfred H Schutte, Cologne, Paris, Bilbao, Barcelona, Milan, Brussels and Liege. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg, Copenhagen. Budapest, London.

THIS IS OUR

"D" STANDARD GRINDING MACHINE

It takes emery wheels to 20" x 4" x 1 1-2".

Standard Grinding Machines are made in six sizes and take emery wheels from 10" to 34".

Our latest Catalog contains full particulars and is yours for the asking.

Diamond Machine Co.
Providence, R. I.

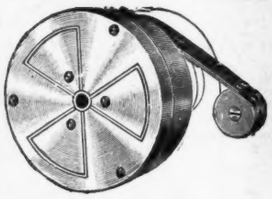
STAR HACK SAW MACHINE

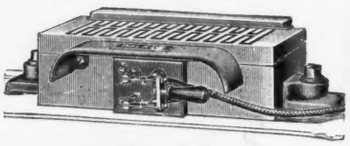
Cuts up to 4 1-2 inches in diameter and adapts itself to all kinds of work. Takes care of itself when making cut, and stops when the work is done. No tool that we have ever made has given better satisfaction. Price $25.

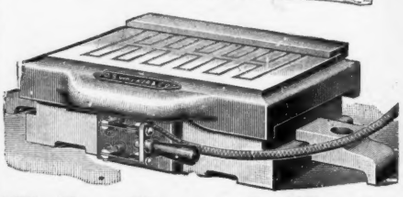
MILLERS FALLS CO.
28 Warren St., N. Y.

2000 Chucks in use

All Styles







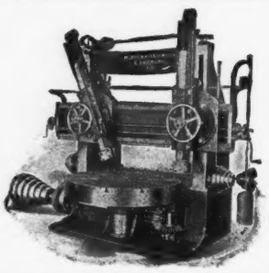
Walker Magnetic Chucks

For holding flat work on surface grinder or planer.

O. S. Walker & Co., Worcester, Mass.

Boring and Turning Mills.

4, 5, 6, 7 AND 8 FOOT SWING



Send for photographs and prices.

H. BICKFORD & CO., Lakeport, N. H.

EST. 1863. **BLACK DIAMOND FILE WORKS** INC. 1893.

TWELVE MEDALS awarded at INTERNATIONAL EXPOSITIONS.

GRAND PRIZE GOLD MEDAL at Atlanta, Ga., 1895.

Catalogue sent free to any interested file user upon application.

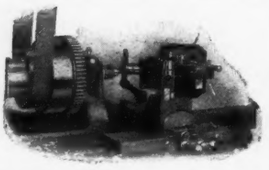
G. & H. BARNETT COMPANY, - Philadelphia, Pa.

THE ORIGINAL AND BEST

The "Wiley" Electrical Driven Center Grinder

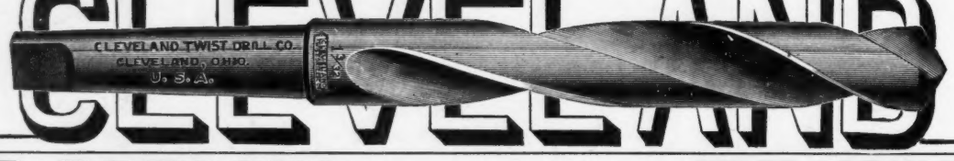
was the first in the field and still holds the top position. Adapted also for cutter grinding and for internal, surface and cylindrical grinding. Three sizes. 110 or 220 volts. Direct current.

MANUFACTURED BY
James Clark, Jr. & Co., Louisville, Ky.



GLEASON WORKS GEARS & GEAR PLANERS ROCHESTER NEW YORK

New York — Chicago



CLEVELAND

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DROP PRESSES

For all Purposes Our Specialty.

MINER & PECK MFG. CO.
PROPRIETORS OF
The Peck Drop Press Works, New Haven, Conn.

ELECTROTYPERS

All kinds of Plates for printing

THE LOVEJOY CO., Established 1853, **444-446 Pearl St., New York**

Pull to start and pull to stop Countershafts

The most satisfactory countershafts made.

Builders Iron Foundry, Providence, R. I.

This is the Original
NICHOLS TAP WRENCH
Superior to all others.
See our Ad. on page 135

YEARS ON THE MARKET.
HANDLE DOES NOT ROTATE.
Take no other. Beware of imitations.

J. M. CARPENTER TAP & DIE COMPANY, PAWTUCKET, R. I., U. S. A.